

AMERICAN **FORESTS**



OCTOBER 1939

35 CENTS A COPY



*IT'S A GOOD INSTRUMENT
TO USE BECAUSE BACK OF IT THERE ARE
FRIENDLY AND COMPETENT PEOPLE SERV-
ING YOU . . . ABOUT 300,000 OF THEM*

BELL TELEPHONE SYSTEM



AMERICAN FORESTS

EDITOR

Ovid Butler

ASSOCIATE EDITORS

Lilian Cromelin

Erle Kauffman

Published monthly by

THE AMERICAN FORESTRY ASSOCIATION

919 Seventeenth Street,
Washington, D. C.

The American Forestry Association is a citizens' organization for the advancement of intelligent management and use of the country's forests and related resources of soil, water, wild-life and outdoor recreation.

Its educational activities, of which publication of AMERICAN FORESTS is one, seek to bring about a better appreciation and handling of these resources, whether publicly or privately owned, in order that they may contribute permanently and in the highest degree to the welfare of the nation and its people.

In addition to publication of two magazines — AMERICAN FORESTS and CONSERVATION, both designed to keep before the people of the country important conservation questions and issues, the Association carries on educational projects in various fields including forest fire prevention, reforestation, protection and propagation of fish and wild-life, upstream flood control, prevention of soil erosion, preservation of wilderness areas, establishment of national forests and parks, development of forestry by private endeavor and the teaching of conservation in the schools of the country.

The Association is independent. It has no connection with any federal or state governments. It is non-political and non-commercial. All its resources and income are devoted to the advancement of conservation. It has been so operated since its founding in 1875. All citizens interested in conservation are eligible for membership.

CONTENTS

VOLUME 45

October, 1939

NUMBER 10

AMERICAN FORESTS

Page

- 482 READERS' FORUM
- 485 THE EDITOR'S LOG
- 487 CONSERVATION OVER THE DAM
By Erle Kauffman
- 492 BLISTER RUST THREATENS THE SUGAR PINES
By Winfield B. Dunshee
- 496 EXPLORING TROUT STREAMS FOR BETTER FISHING
By George A. Lewis
- 498 THE SEED MAKES THE TREE
By L. S. Gross and M. A. Huberman
- 502 TREE MEMORIES
By W. L. McAtee
- 504 CO-OP IN THE TIMBER
By Stewart H. Holbrook
- 506 THE DESTROYERS
Poem by Edith Livingston Smith
- 507 EDITORIAL
About Men and Flames
- 508 OSAGE-ORANGE—Tree Series
By G. H. Collingwood
- 511 FECHNER CLARIFIES CIVILIAN STATUS OF CCC
- 512 THOMOMYS THE ENGINEER—FRIEND OR FOE?
By Lee D. Rice
- 514 FIRE STRIKES AGAIN IN THE TILLAMOOK
By John B. Woods
- 518 WITCHES'-BROOM
By Marvin E. Fowler
- 519 YOUR FORESTS—WORTH PROTECTING
By George E. Griffith
- 520 YOUR SHADE TREES—Let's Plant a Tree—Properly!
By A. Robert Thompson
- 522 NEW PUBLICATIONS
- 523 ASK THE FORESTER
- 528 "WHO'S WHO" AMONG OUR AUTHORS

The Editors are not responsible for loss or injury of manuscripts and photographs while in their possession or in transit. All manuscripts should be accompanied by return postage. The Editors are not responsible for views expressed in signed articles Notice of change of address for AMERICAN FORESTS should be received by the tenth of the month preceding issue.

Member A. B. C.

Copyright, 1939, by The American Forestry Association

35c A COPY, \$4.00 A YEAR

READERS' FORUM

ATTENTION—FRIENDS OF JOHN BURROUGHS

SIR: The John Burroughs Association desires to get in touch with all organizations in the United States and elsewhere that have been organized in honor of John Burroughs. The purpose is to learn whether such groups would be interested in a yearly publication containing reports from these various units, as well as articles about John Burroughs. Please communicate with this writer at the American Museum of Natural History, 77th Street and Central Park West, New York City.—*Dr. Clyde Fisher*, President, The John Burroughs Association, New York.

EDUCATION IN NORTH CAROLINA

SIR: The North Carolina Forestry Association plans educational programs by assistance of civic clubs, public schools, colleges and universities, state and national forestry departments. The plans are to present forestry and wildlife to every public school library, and also present each school with a copy of the American Forestry Association's forest fire prevention painting by James Montgomery Flagg. These presentations will be conducted by clubs and forestry association members.—*Colin G. Spencer*, Carthage, North Carolina.

INTERNATIONAL LOG RULE FOR NEW ENGLAND

SIR: In connection with the salvage operation in New England, the Federal Government uses the "International" log rule. This rule was developed by Professor Judson F. Clark, Forester of the Department of Lands and Waters, Ontario. It is designed for use with a band saw cutting a saw kerf of $\frac{1}{8}$ inch. Since, however, it is probable that most of the logs will eventually be sawed by small mills equipped with circular saws, an allowance of $\frac{1}{4}$ inch for saw kerf is being made. This reduces the actual scale of the International rule by $9\frac{1}{2}$ per cent.

In developing the original rule, as stated, an allowance of $\frac{1}{8}$ inch was made for saw kerf and in addition an allowance of $\frac{1}{16}$ inch for shrinkage and unevenness in sawing. The minimum board is 3 inches in width, containing not less than 2 board feet. A 3 inch board must be at least 8 feet long in order to be included; a 4 inch board 6 feet long; a 5 inch board 5 feet long; a 6 inch board 4 feet long. An allowance is made for a taper of $\frac{1}{2}$ inch for each 4 feet of length. Provision is also made for losses due to normal crook and human and mechanical imperfections. The average crook allowed in the rule is about $1\frac{1}{2}$ inch, and does not exceed 4 inches in 12 feet. The theoretical allowance for waste in edging, crooks, etc., was determined by mathematical computations which were checked by tests at the sawmill.

As you are of course aware, no two trees are exactly alike in form. In addition, various defects, both at and near the surface and hidden, may be present which require fine judgment on the part of the scaler to determine their extent and effect upon the standard scale. The instrument used for measuring logs is called a "scale stick," "scale rule" or "log rule."

There are a large number of log rules in existence, some of which are applicable only to certain species or to certain localities. For the salvage job in New England, however, it is believed that the International rule, modified to include $\frac{1}{4}$ inch saw kerf, plus experienced scalers, is the fairest to both the timberland owner and the Federal Government.—*C. Stowell Smith*, Acting Chief, Division of Private Forestry, U. S. Forest Service, Washington, D. C.

GARDEN, NATURE AND FLOWERS

SIR: For some time we have been watching the growing interest in garden, nature and flower photography. With this fact in mind, the Pittsburgh Garden Center is sponsoring a "Garden Photography Contest" which will be open to everyone interested. We shall appreciate it if it would be possible for you to make an announcement in your magazine of this contest. Inquiries for information may be referred to us.

This is the first contest of this type which our organization has sponsored and we are anxious for it to succeed. We hope to find enough interest in it to make it an annual contest of national scope.—*E. Eleanor Knight*, Pittsburgh Garden Center, Schenly Park, Pittsburgh, Pennsylvania.

ABOUT WILDLIFE IN GOTHAM

SIR: Although "Wildlife in Gotham," by Lorine Letcher Butler (August, 1939, issue), well illustrated the tenacity with which birds and other wild animals cling to their old haunts in a metropolis, one is compelled to point out the absence of an ecological niche for the larger hawks which this article claimed for steel, stone and masonry.

Peregrine falcons do not as yet nest on the roofs of apartment houses, even in Brooklyn. Eagles haven't nested on the Palisades since at least the turn of the century. Both these reports appeared in the New York press and were subsequently proven to be fiction. Hi-jacking herring gulls is only one step removed, I suppose, from stealing babies. Are you going to add one more eagle legend to America's overflowing store of unnatural history?—*Joseph J. Hickey*, Flushing, New York.

OSAGE-ORANGE; MACLURA vs. TOXYLON

SIR: I return herewith the carbon copy of your excellent article on Osage-orange. I would strongly urge writing it Osage-orange (capital O because it is named af-

ter the Osage Indians, and hyphenated because it is not a true orange, or *Citrus*).

Dr. E. L. Greene (formerly consulting expert in botanical matters for the Forest Service) has well written up (in the 2d volume of his "Pittonia") the status of the nomenclature of this tree. It was first described by Rafinesque in 1815 as *Ioxylon* (meaning arrow wood); Rafinesque, finding out his mistake, later (1817) published the name *Toxylon* (meaning bow wood). *Maclura*, published one year later by Nuttall, is conserved under International Rules; *Toxylon* (one year older) is preferred under American Rules. Personally, I am sorry to see *Toxylon* go. I am an American Rules man obliged to adopt International Rules because everybody else is doing it, and, in a democracy, you have to do what the majority wishes. Nuttall's dedication of this genus is as follows (I quote from his "Genera," a personal copy of which lies before me): "Dedicated to William Maclure, Esq., of the United States, a philosopher whose devotion to natural science, and particularly to the geology of North America, has scarcely been exceeded by Ramond or Saussure in Europe."

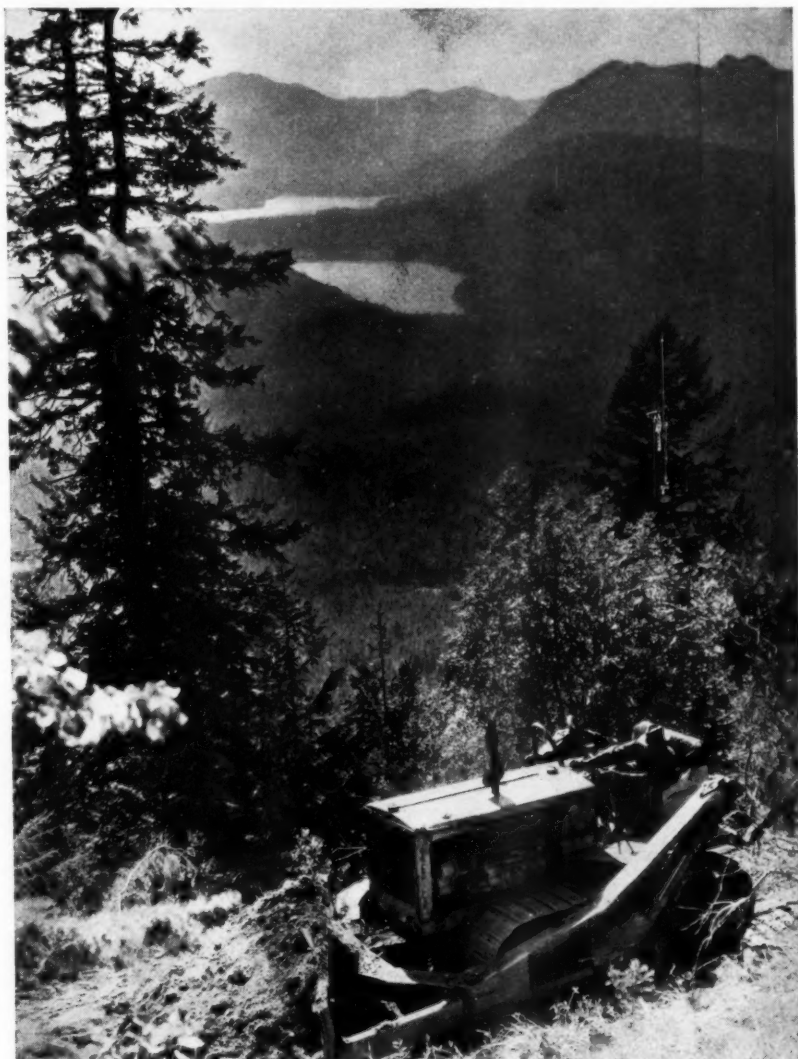
You ask about Schneider and Maclure. Camillo Karl Schneider, eminent German forester and dendrologist, was born in 1876. I have the impression that he died recently, but, at this writing, do not seem to be able to put my finger on the right document to show it (if it is a fact). He was for years a collaborator of the Arnold Arboretum at Jamaica Plain, Massachusetts, monographing willows in which group he was particularly outstanding. Possibly his best known work is the encyclopaedia, 2-volume "*Illustrierte Handbuch der Laubholzkunde*."

William Maclure is called the "Father of American Geology," and was one of the five or six best known American scientists during the first decades of the 19th century. He was born in Ayr, Scotland, in 1763 and died in Mexico in 1840. He published memoirs of a geological survey of the country 1809-1817. His geological map of America published in 1809 created a scientific sensation, antedating, as it did, by six years the first geological map of the British Isles. From 1817 until his death he was president of the Academy of Natural Sciences of Philadelphia, perhaps the foremost scientific honor of the day in this country. At his death he left about \$25,000 and a priceless library of 5,000 scientific works to that institution. He came to this country in 1796, after having made a considerable fortune (for those days) in business. He was a member of the famous "New Harmony Community" between 1825 and 1827.

Wouldn't it be of interest to intimate somewhere in your article that it was the invention of barbed wire fences that put Osage-orange into the background? Prior to the existence of that type of fence, Osage-orange was about the best *chevaux-de-frise* we had.—*W. A. Dayton*, Senior Forest Ecologist, In Charge, Range Forage Investigation, U. S. Forest Service, Washington, D. C.



“Caterpillar” track-type Tractor, equipped with a LaPlant-Choate trailbuilder, grading fire-trails in the Cascade Mountains of the Wenatchee National Forest.



ON GUARD BETWEEN FOREST AND FIRE!

Throughout the nation's timber-belts, “Caterpillar” track-type Tractors are a constant and effective barrier to fire. You'll see them building trails, roads and breaks in anticipation of danger. And when fire actually threatens, they are usually among the first of the forces to answer the alarm. Dependable . . . powerful . . . sure-footed . . . and economical in operation, “Caterpillar” track-type Tractors have rightly become one of the most trusted and effective weapons of the modern Forest Service!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U.S. PAT. OFF.
DIESEL ENGINES
TRACK-TYPE TRACTORS
ROAD MACHINERY

Please Mention AMERICAN FORESTS When Writing Advertisers



Philip W. Ayres

■ Second on the Board, in order of years of service, is Philip Wheelock Ayres, veteran conservationist. Mr. Ayres was elected a director of The American Forestry Association at the 27th Annual Meeting, held in Washington, D. C., in January 1908. He served three consecutive terms of one year each—or through 1910. Then an interim occurred and in 1936 he was elected to serve four years, through 1939.

Though born in Iowa, the name of Philip W. Ayres is linked inseparably with New England, for he has devoted his adult life to the development of forest and conservation interests there. It has been well said that "green monuments" in the hills of New Hampshire stand as an

OUR DIRECTORS

enduring tribute to him and his life of accomplishment in directing the work of the Society for the Protection of New Hampshire Forests—to which he was elected on its organization in 1900, and to which he gave constant and brilliant service until his retirement in 1936.

Trained for organization work at Cornell and Johns Hopkins, for twelve years he was associated with philanthropic organizations—a splendid foundation for his later activities in forestry and public relations. In New Hampshire he created a working understanding between the lumbermen and interests concerned with conservation, and proved then that people and trees may work together for the common good and that lumbering was not at all incompatible with good forestry practice. A revolutionary viewpoint in that day, he nevertheless made it stick, and the most tangible evidence of this lies in the White Mountain National Forest today,—one million acres managed by trained men where lumbering is carried on, hunters, fishermen and the public are welcome. He worked tirelessly to bring about the preservation and development of various state forest reservations, notably those outposts of beauty in New Hampshire—Franconia and Crawford Notch, and the Lost River region. Nationally, Mr. Ayres became known through his work for the Weeks Law, which created the first national forests in the East. His labors for this first great forest legislation are too well known to need elaboration. Since his retirement, he has traveled both here and abroad, studying economic phases of forestry and conservation, and writing in these fields. From this all too brief sketch of his background, it may be seen how valuable to the Association his long continuing contact has been. A pioneer in forest organization in America, he brings to his service on the Board a fully informed mind, an intense and patriotic interest in the work of the Association and a wise toleration that comes only with the mellowing years.

THE AMERICAN FORESTRY ASSOCIATION

919 SEVENTEENTH STREET, WASHINGTON, D. C.

OFFICERS

President
JAMES G. K. MCCLURE

Executive Secretary
OID BUTLER

Treasurer
GEORGE O. VASS

Forester
G. H. COLLINGWOOD

Business Manager
FRED E. HORNADAY

Vice-Presidents

Goodwin B. Beach — Connecticut — Connecticut Forest and Park Association

John W. Blodgett, Jr. — Michigan — Wright-Blodgett Company, Limited

Jay M. Darling — Iowa — National Wildlife Federation

Otto C. Doering — Illinois — Izaak Walton League of America

Newton B. Drury — California — Save-the-Redwoods League

William L. Finley — Oregon

James Montgomery Flagg — New York

William L. Hall — Arkansas

C. F. Korstian — North Carolina — Society of American Foresters

Mrs. H. E. Kyorlie — California — General Federation of Women's Clubs

Julian P. McGowin — Alabama — W. T. Smith Lumber Company

H. Gleason Mattoon — Pennsylvania — Pennsylvania Forestry Association

L. T. Murray — Washington — West Fork Logging Company

Arthur Newton Pack — New Mexico — Charles Lathrop Pack Forestry Foundation

Gifford Pinchot — Pennsylvania
Edmund Secret — Ohio — Ohio Forestry Association

James G. Stahlman — Tennessee — American Newspaper Publishers Association

James J. Storrow — New Hampshire — Society for the Protection of New Hampshire Forests

Tom Wallace — Kentucky — Louisville "Times"

Mrs. Kemble White — West Virginia — National Council of State Garden Clubs, Inc.

Mrs. Andrew Murray Williams — New York — The Garden Club of America

Board of Directors

Philip W. Ayres, 1939 — New Hampshire — Society for the Protection of New Hampshire Forests

F. W. Besley, 1940 — Maryland — State Forester of Maryland

W. H. Brown, 1939 — New Hampshire — Forestry Commission

F. R. Camp, 1940 — Virginia — Camp Manufacturing Company

Samuel T. Dana, 1942 — Michigan — School of Forestry and Conservation, University of Michigan

Karl T. Frederick, 1941 — New York — New York State Conservation Council

Henry S. Graves, 1941 — Connecticut — Yale School of Forestry

William B. Greeley, 1943 — Washington — West Coast Lumbermen's Association

A. S. Houghton, 1939 — New York — State Reforestation Commission

John C. Merriam, 1941 — District of Columbia — Carnegie Institution of Washington

Joseph Hyde Pratt, 1943 — North Carolina Forestry Association

Wilbur K. Thomas, 1943 — Pennsylvania — Carl Schurz Memorial Foundation

John W. Watzek, Jr., 1940 — Illinois — National Lumber Manufacturers Association

Vanderbilt Webb, 1942 — New York — New York Forestry Association

William P. Wharton, 1942 — Massachusetts — National Association of Audubon Societies



happiness and spiritual contentment—the kind of peace that follows, as night follows day, when man is liberated from the frail laws he has imposed upon himself and becomes a citizen in the Universe of Nature.

Fortunately for Americans such an avenue is open. It begins at their front doors and ends beside some incredibly blue lake, or in some valley peopled with wildflowers, or on some lonely, star-guarded peak. For America, in its deepest reaches, is still under the rule of Mother Nature. There are still areas where no man has lease, where conquest is reserved only for those great natural forces of wind and water. You will find them in the hinterlands of our remote western national forests and national parks.

Up to seven years ago these sanctuaries of peace were known only to a favored few, mainly those skilled in the ways of wilderness travel and those whose adequate budget permitted the hiring of essential skill and guidance. Needless to say that for millions of people these restful havens of untrammelled beauty were as unattainable as the stars. Now it is different. With the creation by The American Forestry Association in 1933 of its Trail Riders of the Wilderness, citizenship in the Universe of Nature is for all who would seek it.

Readers of AMERICAN FORESTS are familiar with these unusual expeditions; many have participated in them, some but once, others a half dozen times. They are well aware that out there, a hundred miles from the nearest radio, or newspaper, or telephone, or automobile horn, it is easy to achieve that repose, that degree and quality of faith, that leads to peace of heart. Where Nature is master, the scrolls of man go unread, his utterances and challenges go unheard. There prevails only the voice and law of Creation.

Under such conditions all men are as one. Fellowship is fully realized, not as some abstract ideal, but as the natural consequence of a peaceful and democratic existence. No man is king in the realm of Nature; nor is any man a slave. The only throne to which he must answer is the throne upon which rests his own heart.

Nearly eighty men and women sought these far-flung sanctuaries of peace this past summer under the leadership of The American Forestry Association. They came from every corner of the nation,—from many different stations of life. From the national capital came Robert H. Jackson, Solicitor General of the United States, and his daughter, Miss Mary Jackson; from New York came Lester F. Scott, Camp Fire Girls executive, and Miss Marian Mair, teacher; from Chicago came A. H. Hutchinson, manufacturer; from Kansas City, David Beals, banker, and Miss Mary Downing, librarian; from California came Miss Ella May Ottery, nurse—just to mention a few.

The year ahead looms grim and fraught with conflict. More than ever shall we need to turn somewhere for quiet happiness and spiritual contentment—for peace of heart. There is always the wilderness, the untrammelled universe of Nature—and to your service in its enjoyment The American Forestry Association dedicates its Trail Riders of the Wilderness.

Orin Foster
Editor.



United States Forest Service

Unique in its resources of forests, wildlife and people is the great Santee basin of South Carolina. It holds the finest virgin stands of hardwood and cypress remaining in the South; its broad delta regions form a veritable paradise for wildlife; while on its lands devoted to agriculture are many old plantation homes of unusual historical interest. How will these resources be affected by the \$40,000,000 hydro-electric and navigation project, designed to substitute industry for a failing agriculture, now under development there? That is what conservationists the country over are asking

CONSERVATION OVER THE DAM

Is Conservation Struggling With a Concept in South Carolina?—Or is the Santee-Cooper Project Merely Another Political Plum? Here, in the First of Two Articles, an Observer Sheds Some Light on a Much-Debated Situation

By ERLE KAUFFMAN

DOWN in the great coastal plain country of South Carolina, where for two hundred years the pattern of life has been cut by the blade of a changing agriculture, conservation is in the throes of its latest paradox. Arising from a multi-purpose development of the Santee River, the factors involved are not particularly new; the problem, it seems, is complex mainly because the dividing line between fact and fancy has been obscured by a haze of unyielding controversy. In fact, it is doubtful if any project in recent years has so disturbed the conservation equilibrium, has generated so much confusion in the conservation mind.

Some attribute this unfortunate dilemma to an era of blind, uncompromising development in which the giants of politics and greed stalk the land in insatiable hunger. Others attribute it to growing pains in the orderly process of rearing the conservation child to its full stature. Undeniably, there is something to be said in favor of both arguments. What has so ruffled the feathers of conservationists the country over is their apparent inability to separate the substance from the semblance, to mould a factual structure of the problems involved. Is this \$40,000,000 Santee-Cooper hydro-electric and navigation project—the largest ever to be undertaken in the southern coastal region—nothing more than a giant political plum, as some conservationists, among them J. N. "Ding" Darling, maintain? Or is it a conservation project, as its creating act states, for the "benefit of all the people of South Carolina and for the improvement of their health and welfare and material prosperity?"

This observer is not qualified to sit as judge or jury. He went into South Carolina as a seeker of fact, as a reporter of events, for the single purpose of investigating all of the factors involved. He interviewed executives and engineers, editors and politicians, foresters and wildlife experts, lumbermen and plantation owners, and a score of others. He delved into records, into history, into technical detail. What he reports here represents, so far as he can determine, the factual case of the Santee-Cooper project.

To set the stage for what is to follow, it is important that one significant fact be held in mind. The Santee-Cooper hydro-electric and navigation project is no mere proposal. It is a reality. It has been sanctioned by the state government of South Carolina, the Federal Power Commission, the Public Works Administration, the Works Progress Administration, and even the Supreme Court of the United States. It has a bank account of \$40,000,000. Its executive and technical organizations are on the job. It has already acquired more than 16,000 acres of land, part of which is in the process of being

cleared. And finally, one of the two dams to be built is actually under construction.

Another thing that should be clearly understood is that the Santee-Cooper is not a project of the federal government—although Washington, as far as can be determined, may be the principal stockholder. It came into being—that is, in its present form—on April 7, 1934, with the creation by the state legislature of the South Carolina Public Service Authority. Actually, it has been contemplated, in one form or another, for the past quarter century. Its objectives, as defined by its creating act, are "the development of the Santee, Cooper and Congaree rivers as instrumentalities of intrastate, interstate and foreign commerce and navigation, and for the generation, distribution, and selling of electrical power," with lesser functions of flood control, reclamation, health control, reforestation and recreation. The intent of the legislature in creating the Authority for the building of the project, according to an Authority spokesman, "was to bring into being a force to revitalize the industrial growth of South Carolina, particularly that of the coastal plain, as a substitute for a failing agriculture, and for the purpose of giving employment to the people of the state, essentially the younger generation, members of which are going into other states for needed employment."

The Authority, and consequently the project, is financed by a direct grant of \$15,435,000 from the PWA and another of \$6,000,000 from the WPA, the latter for labor in clearing land, and by revenue bonds amounting to \$18,895,000 issued by the Authority itself and which the federal government may purchase.

To carry out its objectives, the Authority contemplates the creation of two large reservoirs by the construction of dams across the Santee River at Wilson's Landing, ninety miles from its mouth, and the Pinopolis basin near Moneys Corners, within four miles of where the Cooper River backs up from Charleston harbor. The Santee dam will divert the flow of the river—all but 500 cubic feet a second—through an eight-mile diversion canal into the reservoir created by the Pinopolis dam. This is made possible by the fact that the bed of the Santee is forty-five feet higher than the bed of the Cooper—a unique geological feature in the coastal low country.

As the first objective of the project is a vast hydro-electric development, a power house will be erected on the southern end of the Pinopolis reservoir. It is estimated that the project will have an installed capacity of 171,000 horsepower or about 130,000 kilowatts, which will generate annually—during a year of average stream flow—700,000,000 kilowatt-hours. For purposes of navi-

gation, a single stage lock will be built integrally with the Pinopolis dam, connected by a tail canal with the Cooper River. When completed, it is claimed, the project will provide a 145-mile navigation channel between Charleston and Columbia.

According to present engineering plans, the Santee dam will elevate water to a point seventy-five feet above mean sea level. This means that nearly 100,000 acres will be flooded, practically the entire length of the Santee River from the dam site to where it is formed by the confluence of the Congaree and Wateree rivers. The depth of the reservoir immediately above the dam will be thirty-five feet, the decrease upstream being gradual. Over great areas along the outer fringes of the reservoir engineers place the depth of the water at from five inches to two feet.

The Pinopolis reservoir will cover approximately 60,000 acres and will also impound water to an elevation seventy-five feet above sea level. With an average ground elevation of but ten feet, however, the depth of the water immediately above this dam will be sixty-five feet. To properly confine this water, it will be necessary to construct twenty-six miles of earth dykes.

The development of these two great reservoirs necessitates the acquisition and partial clearing of approximately 171,000 acres of land, 16,000 acres of which have already been acquired.

There, briefly, is the pattern cut for this modern multi-purpose development. Apply it to the particular area involved, the great basin of the Santee, and there immediately arise those problems in conservation which are creating such a furor. For the Santee basin is, undeniably, unique in its resources of forests and wildlife—as well as its people. Lumbermen familiar with the area are agreed that it holds the finest virgin stands of hardwood and cypress timber remaining in the Southeast—some say in the nation. About 19,000 acres of this valuable timber, containing 132,000,000 board feet, fall within the area to be flooded. Surrendered to the reservoirs also will be an area on which is growing second growth hardwood and pine. It is estimated that this young forest contains approximately 70,000,000 board feet of timber.

In the lower reaches of the Santee, in the great delta country below the dam, there exists today a veritable paradise for wildlife, both indigenous and migratory. When the Santee dam is completed the flow of this river will be reduced from a maximum of approximately 360,000 cubic feet a second to a minimum of 500 cubic feet a second. The result will be a proportionate reduction in suitable wildlife habitat, particularly for waterfowl, in the delta region. The Cape Romain Bird Sanctuary of the federal Biological Survey, occupying a fifty-mile strip of coastal marsh land between the mouth of the Santee and Charleston, is dependent to a great degree upon the Santee River for its supply of fresh water. With this supply radically reduced, the region's value as a sanctuary for fresh water wild ducks may rightfully be questioned.

Last but not least is the fact that in the area to be flooded by the two reservoirs are many old homes and plantations, some of unique historical interest. A few of these have been in a state of cultivation for more than a hundred years, others have been turned into private hunting preserves. All told, it is estimated that between 2,500 and 3,000 people, of whom about four-fifths are said to be negroes, together with their schools, their churches, their ancient graveyards, will be directly affected when the waters of the Santee are backed up behind the man-made dams.

Reduced to specific problems, and keeping well in mind that the project is actually under construction, the Santee-Cooper project from the conservation viewpoint appears to line up as follows:

First, can the great virgin forest of hardwood and cypress, as well as valuable second growth pine and hardwood, be salvaged before the area is flooded? Under the present agreement with the PWA, the dam and all land clearing must be completed by July, 1941.

Second, if salvage is attempted within the time limitations of the project, what effect will such operations have on the southern hardwood industry?

Third, what effect will the removal from production of approximately 100,000 acres of perhaps the finest hardwood growing land in the South have on forestry and the forest industries in the state?

Fourth, what can be done to compensate the region for the destruction of wildlife environment resulting from the reduced flow of water below the Santee dam?

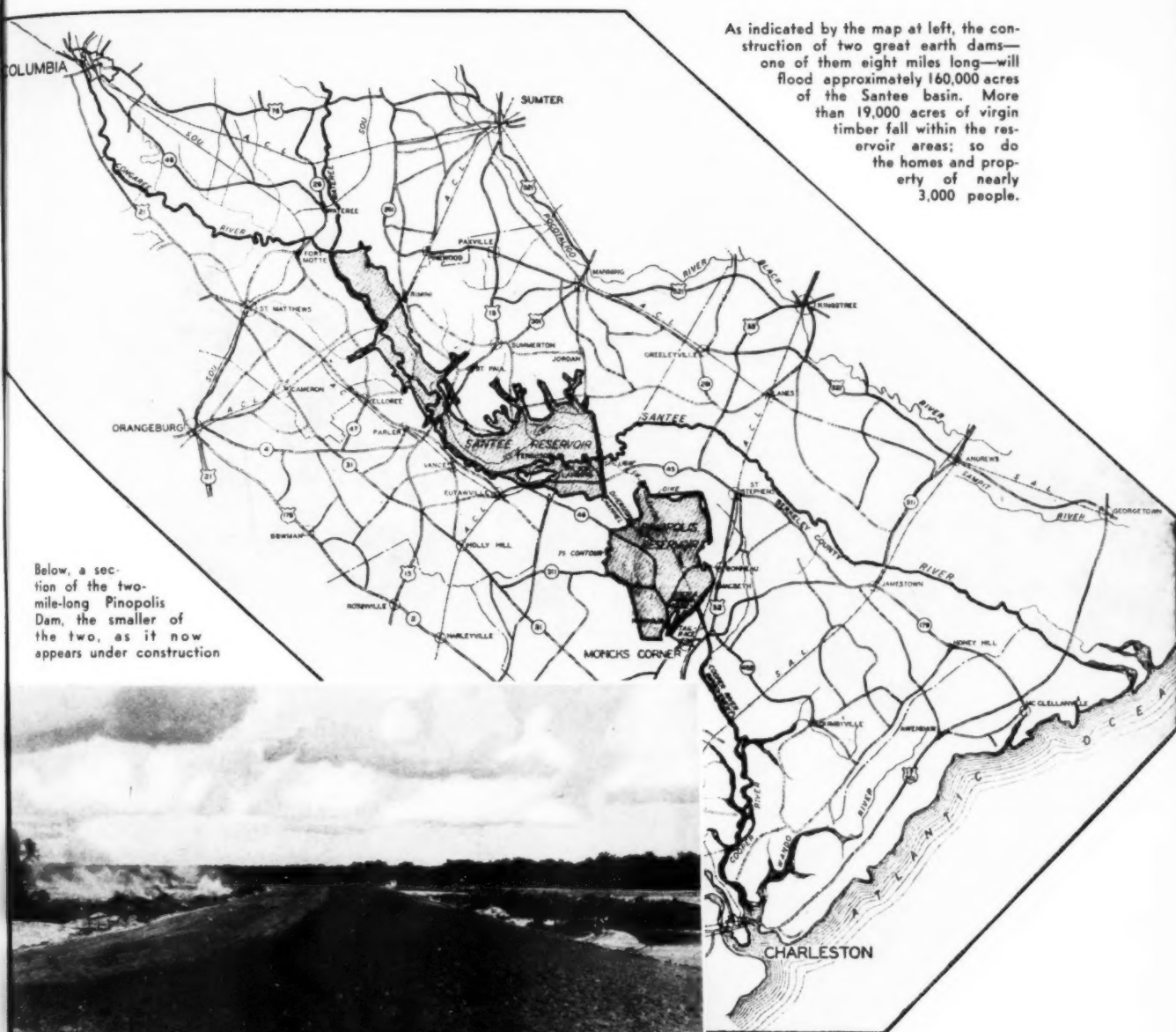
Fifth, what can be done to compensate the hundreds of landowners in the areas to be flooded for the loss of home and property?

Sixth, is the Santee-Cooper project a legitimate conservation undertaking, as its planners maintain, or is it a political raid on the United States Treasury, as its critics claim?

Before these problems are discussed, two questions that have provided some of the richest fuel for the fires of controversy should be dealt with. They are: Is there need for such a project in South Carolina? And, in view of certain engineering difficulties, can the project be completed? Strange as it may seem, there are an amazing number of people, among them plantation owners whose homes and lands are destined to be submerged, who are thoroughly convinced the project will never reach fruition. Why? The essence of their reckoning, no doubt, is found in the words of a planter whose father and grandfather had cultivated his Santee plantation before him. "You can't put something on nothing," he said, "and that's just what's under this country down here—nothing but sink holes. No sir, you can't hold that river back."

But to get back to the question of the need for such a project in South Carolina. Arguments against it are (1) that the region is not adapted to industrial development; (2) that there is a surplus of hydro-electric power in South Carolina, and, consequently, there will be no market for the power to be generated by the project; (3) that because of existing highways and railroads there is no need for a water route between Charleston to Columbia; and (4) that there is no flood control problem along the Santee.

To these arguments Authority executives reply, in essence, that the economy of the region, first based on rice and indigo culture and then cotton, has declined to such a degree that industrial expansion is necessary in order to stabilize its population. The seriousness of the situation there—in fact, all over the coastal and eastern sections of the state—is demonstrated by the assertion, and it seems to check with existing employment figures, that eighty per cent of the state's college and high school graduates are forced to seek profitable employment in other sections of the country. Not only, it appears, is the production of cotton and cotton derivatives declining in profitability, but all of the auxiliaries, such as transportation, brokerage, warehousing insurance, shipping and other adjuncts to the handling of this kind of volume crop, have had a depleting decline. Replacements of cotton production are occurring, but not to the extent of returning the area to profitable levels necessary for an



acceptable economy.

How can this needed industrialization be brought about? The Authority points to a bit of history. Said a spokesman: "Thirty years ago the late James Buchanan Duke dedicated a part of his fortune to the industrial development of the Piedmont sections of North and South Carolina, a development that had its beginnings in the construction of hydro-electric projects near Rock Hill. The world knows that the result of that pioneering adventure has been the industrialization of the upper tier of counties in South Carolina. It is the unshakable belief of those who are building the Santee-Cooper project that a like effect will take place in the lower part of the state."

The phenomenal industrialization of the Piedmont region of South Carolina is indeed well known. Nor is there doubt that, in addition to a favorable climate and dependable labor, the greatest factor contributing to this development of the cotton textile industry was the abundance of cheap hydro-electric power from the Piedmont streams.

It seems reasonable to grant the Authority its point that something is needed to restore the region to an acceptable economy. The true picture of the situation in the region, as well as in a good part of the coastal Southeast, may be found in population studies made by the National Resources Committee in 1938. Said the Committee: "The situation in the Southeast seems to

present the following choices, or a combination of them: First, continuance of widespread poverty; second, large subsidies from other areas; third, development of extensive new industry, either agricultural or mechanical; fourth, development of extensive lines of production for home use, or some sort of cooperative enterprises; or, fifth, emigration within the near future of from 3,000,000 to 6,000,000 people to seek new opportunities in other regions."

It seems quite obvious then that, the cotton situation being what it is, the desired economy for the Santee, as well as that of other regions in the Southeast, cannot be achieved entirely by the production and utilization of substitute agricultural crops. Industry must come into the picture.

But with particular reference to the Santee basin, what industries? Perhaps the resources of the region will answer this important question. Studies made by the Authority reveal that within a hundred-mile radius of the proposed Pinopolis hydro-electric plant are extensive supplies of high-grade calcium; kaolin and other good clays; medium grade phosphates; salt water; silica sand; peat; and, of course, hardwood and pine timber. From these, with low power cost, it is pointed out that the following industries can profitably operate, few of which are now found as electro-thermal or electro-chemical industries south of Niagara Falls: To mention a few—aluminum, sodium, hydrogen peroxide, nitric acid, water glass, Portland cement, calcium carbide, cyanamid, phosphoric acid, and from the forests, pulpwood, wood flour, plastics, kraft paper, newsprint, and alcohol.

It is further stated that the combination of deep water for imports and exports, inland waterway routes, interior navigation, highway, rail and air traffic facilities, makes the Port of Charleston unique in its shipping facilities, with its back country an appropriate area for processing raw materials from the interior of the United States, as well as imported materials from abroad. Add a new low in power rates to the advantages of labor and climate, and this area becomes one for other manufacturing processes such as furniture and woodworking plants, tobacco plants, cotton and silk mills, refrigeration and storage facilities, canneries, and others.

The Public Works Administration investigated these resource and industrial claims of the Authority and found them plausible enough to participate in the project. Furthermore, they correspond generally to resource studies made by the state prior to the creation of the Authority. Consequently, it would appear that while the Santee region may not be another Piedmont, it does have a place in the industrial scheme of things. Whether or not this place justifies a \$40,000,000 development remains to be seen. There is too much that is nebulous in its program for industry, to much that is based entirely on hope, to reach a definite conclusion at this time. Actually, the Authority has made no contracts; nor, it appears, will any be made until the project is completed.

Frankly, the chemical fields appear to offer the region's greatest opportunity for industrialization as it seems a matter of history that before modern manufacturing processes came into being, the Santee country was on its way toward developing quite a chemical industry. Modern processes, however, call for cheap power, and since it did not exist at that time, the industry moved out. With cheap and abundant power, together with low water transportation rates, the Authority may, and logically does, look for its return.

The forest industries, however, present a different picture. As previously stated, the Santee basin is one of the finest timber growing regions in the South, but for-

est industries are already established there, particularly in its upper reaches in the vicinity of Sumter. Likewise, two large pulp mills have recently been built, one at Georgetown to the north, the other at Charleston to the south. The degree, therefore, that development here may be expected appears to rest entirely on the degree it is economically feasible to expand the forest industries, particularly in manufacturing branches. At the moment, this outlook is not over-encouraging.

South Carolina, according to the United States Geological Survey, ranks sixth among the states of the nation in developed water power—due primarily to the intense hydro-electric development in the Piedmont region. This has led critics of the Santee-Cooper project to the conclusion that there will be no market for the power to be generated by the project; indeed it is pointed out from some sources that there is at the present time a surplus of power in the state. As evidence, the fairly recent development on the Saluda River near Columbia has been spot-lighted, the claim being made that because of a low market for its current, it is operating at about twenty per cent of its capacity.

Examination of the transmission map published by the Federal Power Commission reveals a closely interwoven network of high tension lines in approximately one-third of South Carolina's area—the Piedmont region. These lines were placed there to serve a highly industrialized section, and their concentrated load is heavy. The remaining two-thirds of the state is served by a network of relatively low power, low voltage transmission lines placed obviously to serve a very different purpose, to meet the needs of a region devoted primarily to farming.

What does this picture mean to advocates of the Santee-Cooper project? Simply that one-third of the state—the Piedmont region—has adequate power to attract and maintain industry while the remaining two-thirds—the coastal and eastern regions—is without adequate power and is therefore without industry.

Without becoming too involved in the maze of figures dealing with horsepower and kilowatt hours, without attempting to interpret the relationship of firm power to secondary power, or hydro-power to steam power, it would appear that there is no great surplus of power in South Carolina at the present time, that in some regions there is an actual need for additional power, and that considering South Carolina, southern North Carolina and eastern Georgia as a unit, the total deficiency of capacity by 1941 may reach 360,000 kilowatts, this figure having been taken from the report of Army engineers to the Secretary of War on the Clark Hill development near Augusta, Georgia. What is more to the point, the Army engineers further report that when the Santee-Cooper project is completed, the deficiency in dependable capacity may still be around 225,000 kilowatts.

According to the Federal Power Commission, the installed capacity of electric generating plants in South Carolina for 1938 was slightly over 630,000 kilowatts. Production of electric energy for the same year was around 1,500,000,000 kilowatt hours, a figure that would indicate, according to the Commission, a better than fair market in the state for its existing power. About twenty-three per cent of this current was sold outside of the state, mostly in North Carolina; but at the same time, the Commission revealed, it was necessary, to meet state demands, to import from North Carolina and Georgia about eighteen per cent of the total energy consumed, or in the neighborhood of 225,000,000 kilowatt hours, which is about one-third of the proposed installed capacity of the Santee-Cooper project.

In the Piedmont region the Duke Power Company

within the past year or so has increased its capacity by 70,000 kilowatts. Certainly this would not have been done in the face of surplus power. And as to the much discussed situation on the Saluda River, it is interesting to note what Dr. Clark Foreman, director of the Power Division of the Public Works Administration, who has more than a passive interest in the Santee-Cooper project, has to say about it.

"According to the Associated Gas and Electric System," Dr. Foreman said, "the maximum anticipated capacity of the Saluda River development is 360,000,000 kilowatt hours. In 1937 this plant generated and sold 310,000,000 kilowatt hours, and in 1938, due to low water, the plant output was 150,000,000 kilowatt hours, while the net output of the company by generating and purchases was 225,000,000 kilowatt hours. Thus it is evident that the plant is operating at more than twenty per cent capacity as many have suggested." Actually, if

natural resources, the character and industry of its people. The South Carolina Public Service Authority has those contemplated purposes."

At the moment the Authority is negotiating with two utilities operating in South Carolina—one affiliated with the Associated Gas and Electric Company, the other with Commonwealth and Southern—for the acquisition of their distributing systems, particularly for the steam plant now supplying the city of Charleston with its current. Records reveal that this plant in 1938 generated 37,000,000 kilowatt-hours, and the total consumption for the district, which is principally the city of Charleston, was 49,000,000 kilowatt-hours.

Hand-in-hand with the project's power objectives is navigation—a waterway between Charleston and Columbia. Obviously, this feature of the project has a two-fold purpose—to lower rates on slow-moving freight such as cotton, fertilizer and gravel between the seaport



Countless thousands of wild ducks feed in the great Santee delta below the sites of the proposed dams. Also, along the coast between the mouth of the Santee and the city of Charleston lies the great Cape Romain Bird Sanctuary of the federal government. How will wildlife habitat in this region be affected when its supply of fresh water from the Santee is reduced from 360,000 cubic feet a second to 500 cubic feet?

these figures are correct, it is around seventy-five per cent for the two-year period.

The Santee-Cooper project quite apparently has no argument with those who contend that there is no market today in the state for additional power. Where power is concerned, it is interested in futures.

"The power companies operating in the coastal and eastern areas of the state have served small towns for a good many years by shutting down inefficient generating plants and assuming the existing demand, effecting some reduction in rates," an Authority spokesman declared. "These are, however, privately owned ventures, owing their immediate allegiance to holding companies of other sections and, in general, they are not inclined to take chances where immediate revenue is not in sight. Such a perspective cannot produce industrialization in this area. What is needed is some agency with the courage and foresight to make available, first, the needed supply of power at reduced rates, and then 'sell' its soil, its

of Charleston and the regions south and east of Columbia, and to open the area to certain industries requiring water transportation. That it will serve fast-moving freight and passengers is, of course, not contemplated.

To what degree this particular project will achieve its purpose remains to be seen. Indications are, however, that it will bring about an adjustment of rates on certain short-haul commodities. If this comes to pass, there is little doubt that both industry and farmers of the region will be benefited.

The reopening of the Santee-Cooper waterway will revive a fascinating chapter in the history of South Carolina, for the need of connecting the interior with the coastal area was propounded many years ago. It is recorded that as early as 1785 the state legislature was petitioned to charter a company which would construct a canal connecting the Santee with the Cooper. The petition was favorably acted on and the canal constructed, slave labor being used. (Continuing on page 510)



BLISTER RUST THREATENS THE SUGAR PINES

By

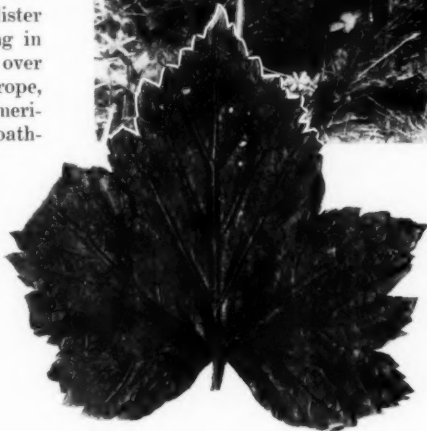
WINFIELD B. DUNSHEE

The insidious danger of the blister rust has reached the Pacific Coast and menaces the sugar pines—giants of the western forests

BEFORE the Red Man knew the White, in fact possibly before there ever was a Red Man in what we now call California, the Sierra Nevada and northern Coast Range country was the home of the tallest of any of the kinds of white pine trees known in the United States. Explorers blazing their early trails to the Pacific Ocean, found these majestic trees in the mountainous regions of the Far West, extending southward from southern Oregon into California for a distance of about a thousand miles. These trees were called the "sugar pines" because of the sugar-sweet exudations which formed in fire scars and other injuries.

Giants of the wooded sites with wide-flung, brawny arms, they seemed, more than any other trees, to symbolize the bold and independent spirit of the West. They became known and loved by lumbermen, hunters, vacationists, and others to whom their rugged beauty and strength was a never-failing source of inspiration, especially to city-tired men and women.

For centuries the chief dangers threatening these rugged trees were fire and man, but in recent years a more insidious danger has reached the Pacific Coast and menaces the future of these great sugar-pine forests. The white pine blister rust, apparently originating in Asia, after spreading over northern and western Europe, eventually reached the American continent. Although pathologists in this country were aware of the destruction in Europe caused by this disease, it was hoped that its ravages might be confined to the eastern hemisphere. Unfortunately, this was not to be the case. With the need for reforesting with white pines in the eastern part of the United States at a time when American nurseries could not supply the demand, white pine seedlings were imported from Europe. This planting stock, without the knowledge of the importers, brought to our shores the virulent blister rust disease. This took place repeatedly some thirty to forty years ago, before protective quarantine measures were adopted, and from these infected trees the rust was established here and later spread to our native white pine forests. In the eastern states it is now present from Maine to Minnesota and extends southward to central Virginia and



A twelve-year-old white pine with four trunk cankers. Until it finally dies, this tree will each year release millions of infecting spores, spreading blister rust far and near to currant and gooseberry bushes—the intermediate host of the rust

Left—The host has received the spores and the resultant hair-like fungous growth on this currant leaf is blister rust. Each hair gives off minute spores, which in turn infect nearby sugar pines—and so the vicious cycle is complete

West Virginia, central Ohio, and northern Indiana, Illinois and Iowa.

Until 1921 the western states knew this disease only by name and reputation, but in that year blister rust was found in several localities centering around Vancouver, British Columbia. A careful study of the records of imported trees and the age of blister rust cankers showed that the disease had apparently been introduced near Vancouver on a shipment of white pine seedlings from France in 1910. Although it was not known at the



This is an ideal set-up for attack by blister rust. Should the disease gain a foothold on this currant bush, the young hardy sugar pine surrounded by the bush would soon be fatally infected

time, these trees must have borne the blister rust fungus in their slender branches and trunks, and perhaps without visible signs on the exterior, there was carried with them to the Pacific Coast the most dangerous enemy the western white and sugar pines have ever faced.

By the time the disease was discovered in 1921 it had become so firmly entrenched and had spread so widely throughout the state of Washington and the Province of British Columbia that its eradication was recognized as impossible and efforts were turned toward working out methods of control. Measures for the protection of the eastern white pines were already under way in New England and the Lake States, but the forest conditions of the West were so different that new methods adapted to the Rocky Mountains and the Pacific Coast region had to be developed.

The peculiar life cycle of blister rust has been carefully studied both in Europe and America, and everywhere it has been found to follow the same course. Blister rust of white and sugar pines, like the black stem rust of wheat, requires two different kinds of plants to complete its life cycle. In the case of blister rust these necessary plants are the white or sugar pines, on which the fungus spends part of its life, and the currant and gooseberry bushes, commonly called ribes, on which it spends the remainder. In California there are six different species of white pines susceptible to blister rust infection; these are sugar pine, western white pine, white-bark pine, foxtail pine, limber pine, and bristlecone pine. In the same mountainous region are found numerous kinds of currant and gooseberry bushes. When a pine becomes infected with blister rust, a canker is formed from which countless millions of dustlike spores are spread by the wind for distances up to 150 miles or more. These spores alighting on pine trees or plants other than ribes are harmless, but those that fall upon the leaves of currant or gooseberry plants cause rust pustules on the underside of the leaves. These pustules produce spores which

intensify the disease on ribes. Later brownish, hairlike projections of the fungus appear on the under surface of the infected leaves and give off the spores that carry the rust back to the pines. The never-failing winds spread these pine-infecting spores to nearby forest trees.



To insure a careful and thorough job of ribes removal, crews work the forest areas in lanes, and mark their boundary lines with string

Fortunately, the spores produced on currant and gooseberry leaves are so delicate and their life is so short that only pines within a radius of about 900 feet are subject to serious damage. Currant and gooseberry plants, are, however, scattered throughout the five-leaf pine regions, and thus most of the white pines are in danger. One tree stricken with blister rust cannot infect another, but they can and do infect the ribes over extensive areas, and the latter in turn infect the nearby pines.

After blister rust was discovered near Vancouver in 1921, it spread northward, eastward, and southward into the important commercial white pine regions of the west. By 1923 it had reached the extensive western white pine stands of northern Idaho and by 1925 had spread into northern Oregon. As it has gradually and steadily

locality and five years later the entire stand was destroyed. The disease attacks the bark, girdling the branches and stems and killing the trees. While the mature stands can often be harvested for a considerable period of years after blister rust arrives in the vicinity, the young reproduction is destroyed and the white pines cannot perpetuate themselves as commercial species unless protected from blister rust infection.

Definitely here to stay, the control of white pine blister rust and the protection of the sugar pine stands of California have become subjects of paramount importance. Fortunately, control measures are possible and practicable, since for complete control it is necessary only to break the life cycle by destruction of the currant and gooseberry plants in and near the trees. With their removal from pine areas, the life cycle of the rust is inter-



The protection of sugar pines from blister rust is essential to maintain the charm of these western mountain areas—enjoyed by the millions who vacation in the forests

moved southward, it has become a serious menace to the valuable sugar pine areas of southern Oregon and California, which cover about three million acres of forest land.

The damage caused by blister rust and the rapidity of its development in a forest region are proportional to the number and susceptibility of the ribes growing within and around the pine stands. As a rule in young stands the tallest and most vigorous of the pines are the ones first and most severely attacked. However, in mature trees the infection often works slowly and the trees may survive for many years. Seedlings and small pine saplings are readily infected and quickly killed, while trees of pole size and larger succumb much more slowly. In one stand of young western white pine averaging about twenty feet in height, ninety per cent of the trees were killed within eleven years after the rust appeared in the

rupted and the source of the pine-infecting spores destroyed. This prevents spread of the disease locally and effectively protects the pine.

Destroy the ribes and save the pines! This sounds like a simple measure of control but it is a tremendous task, for there are about fifteen million acres of commercially valuable white and sugar pines in the United States. In California and Oregon sugar pine is an important forest tree on some three million acres of forest land. Currant and gooseberry bushes are also native and more or less abundant on a large proportion of this area. Their eradication is therefore a large undertaking, and the southward spread of blister rust from Oregon into California is already taking place at such a rapid rate that time is pressing.

Knowing that nothing could prevent blister rust from reaching the sugar pine stands (*Continuing on page 525*)

WE GO FISHING,--- AND MEET A BIOLOGIST

BY GEORGE A. LEWIS

FROM glacier-fed lakes high on the ragged rim of the Sierras in eastern California, Conviet Creek brawls its way through precipitous canyons into Conviet Lake. Then, more sedately, it meanders across the valley to join the famed Owens River.

From opening day to close of season it is good fishing. For in early summer, when other streams are rampant in flood stage and turbid with suspended debris, lower Conviet emerges clean and white from the huge stilling basin formed by the lake, and provides an un-failing stretch of clear water on which to flip a fly. During the tag end of the season, when trout in warmer waters are slow to rise, one can always rely on its cold upper reaches to furnish a basket of golden trout.

For years Soapy and I have fished its length, always saving the last few days of each vacation for this purpose, knowing that it would supply that much needed basket of trout to take home. Small wonder, then, that we were somewhat shocked last summer to find our pet section of trout water cluttered up with a mile or so of barb-wire along with sundry ditches and channels running hither and yon, with dams, screens, nets, pumps and all sorts of equipment scattered around. But most shocking of all were numerous signs to the effect that one might enter, look and ask plenty of questions—but fishing was out.

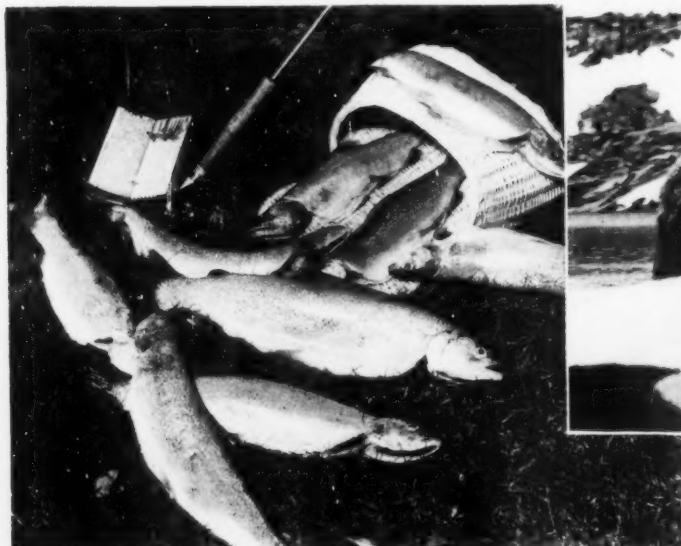
We were in the process of debating this unfortunate turn of events when a congenial looking chap emerged from the willows. "How's luck?" he inquired. Sensing that he might be responsible for what had hap-

pened to the Conviet, I asked, "why all this barb-wire and the 'No Fishing' signs?"

Smilingly he introduced himself as Paul R. Needham, an associate aquatic biologist in the Bureau of Fisheries. "All of this fencing is simply a protection for our experimental station," he explained.

"Experiments on what," Soapy asked; "how much fence it takes to discourage us fishermen?"

Needham smiled and seated himself beside my companion. "It's quite a yarn," he began. "For years fishermen all over the country have been wondering why their fishing gets poorer each season, despite the fact that millions of fish are annually planted in streams and



Soapy—the "copper"—reels in one on a High Sierra Lake

A limit of Goldenes from the headwaters of Conviet Creek

AMERICAN FORESTS

lakes. Well, Uncle Sam would like to know, too, and do something about it. Our station here, established by the United States Bureau of Fisheries with the cooperation of the federal Forest Service and the California Division of Fish and Game, is attempting to solve some of the problems that confront both fishermen and fish culturists in their particular region. Few state departments, I am sure you realize, are properly equipped for such scientific research."

"Well, you can't blame them for that," exclaimed Soapy. "With such equipment as they succeed in beating the politician to, they must produce eggs and fingerlings by the millions, and if they fail the wolves will be howling on their trail. Small wonder then that only the mechanics of raising and planting fish has been concentrated upon. It is about all they have the time and money for. Frankly, I think the state hatcheries are doing a swell job within their limitations."

"You are right about that," said Needham, "and what fishing you fellows enjoy here today you owe to them. For don't forget the streams of Owens Valley were devoid of fish life, except for small chubs and suckers, when white men first arrived. Today it ranks among the nation's best. And with the help of such fact-finding work as we are now doing here the state should be able greatly to increase its progress in providing fish for its thousands of anglers."

"But suppose they do plant more fish?" argued Soapy. "It's still a losing game, for with every increase in planting thousands of new converts go out to whip the streams. Fishermen just naturally increase faster than the fish, until now the ratio is about ten to one in favor of the anglers."

"There's truth in what you say," agreed Needham, "but your ratio is in error. It may surprise you to know that last year California sold 314,791 angling licenses, and for every license sold they planted 104 fish, or a total of 32,607,350."

Soapy was surprised. "Why that is over four limits per man! Lord, and here we are with only two days more vacation to get our share."

"Well," said Needham with a smile, "you are lucky to be fishing in the Sierras. Many streams elsewhere don't pay off so well. But please understand that doesn't mean that all of those 104 fish will eventually land in the anglers' basket—or even mature. While our hatcheries have a high rate of efficiency in producing trout fry, we are still planting fish mostly by guess and speculation, so far as survival rates are concerned. The Mt. Whitney Hatchery, in one season, produced as much as a pound of fish for each 2.79 pounds of food, and with the remarkable record of only twelve per cent loss on approximately 5,250,000 million eggs during the season. In one five-year period California planted 172,000,000 fish in its lakes and streams. Yet after they were planted—how many lived long enough to qualify as 'legal' fish? How many were dumped in lakes and streams already overstocked or barren of food? How many were destroyed by predators? Hopeless questions indeed, and not at all local, for conditions are the same everywhere. But the experiments we have planned and executed here may eventually shed some light on these questions."

After a pause, he went on. "We began here in 1936, which shows that you fellows haven't fished west of the bridge for at least two years."

"Yes," replied Soapy, (*Continuing on page 526*)



Cleaning screens at one of the pools



Dr. Paul R. Needham (left) weighing and measuring food samples



Convict Creek, near Bishop, California—a typical mountain meadow stream and, below, the Experiment Station



THE SEED MAKES THE TREE

Experience and Research in Seed Selection
Are Pointing the Way to the Tree Planter

By L. S. GROSS and M. A. HUBERMAN

Photographs by the Forest Service

WHEN the Indian squaw planted grains of corn she knew that a few months later she could gather her winter food supply of small scrubby ears. Somewhere, sometime, a careless old squaw dropped a dead fish with the small sunken grains and her brave had more corn to eat that winter. But neither squaw nor brave progressed very far toward developing higher yielding varieties of maize.

Today the corn grower of Iowa plants a variety which has been developed for his particular soil and climate, while his brother farmers, in North Dakota, or New York, or North Carolina all use different seed, proved to be most satisfactory in their locality. If all used "squaw type" seed, our food supplies would be far less adequate, for it is common knowledge that plant breeders have increased corn yields greatly by developing types suited to various localities.

Three hundred nineteen generations of corn have come and gone since the Pilgrims arrived at Plymouth Rock. Much land which then grew trees, now grows corn. Some has gone from trees to corn and from corn back to trees. Our farmer in Iowa, or North Dakota, or New York, or North Carolina plants trees as well as corn. Federal and State agencies, municipalities, lumbermen, corporations, and many private individuals plant trees. In the aggregate these agencies are planting close to 250 million trees a year. Thousands of pounds of tree seeds are required annually to grow the young trees used by all these planters.

But the planter of trees cannot harvest his crop in one year. Perhaps the average is seventy-five to one hundred years—only three or four generations of trees since the landing of the Pilgrims on Plymouth Rock! There has not been time for man to develop the best strains of trees for Iowa, for North Dakota, for New York, or for North Carolina. But Mother Nature was developing all sorts of plants—trees and shrubs, as well as corn, tobacco, and other annual crops—to fit each lo-

cality long before the first Nokomis kicked a hole in the ground with the heel of her moccasin and dropped in a few kernels of corn, with or without a white perch. We have not made full use of nature's centuries of experimentation with trees, and have only scratched the surface in the matter of improving on nature. Unless we begin to use present knowledge intelligently, we cannot be sure of the harvest that we are growing for those who follow.

Trees are planted for various reasons: To provide a livelihood for men in the production of lumber, pulpwood, Christmas trees, or kindling; to aid in controlling



As like as "peas in a pod"—or are they? While these white pine seeds look alike, how similar will be the trees which grow from them?

excessive erosion, or to improve watershed conditions; to restore natural beauty destroyed by carelessness; to improve living conditions for farmers and their crops of grain and animals by cutting down the force of devastating winds; and to restore or improve the habitat of our wildlife.

Tree planters in European countries for many years paid scant heed to the type of trees which they planted. As the plantations grew older, however, it became painfully evident that some were extremely poor. The trees grew slowly, they were crooked, they did not yield high grade products. In fact, it became necessary to destroy some plantations and start over again. Strict laws were enacted governing the use of tree seeds for planting. In our own country we have paid too little attention to the pedigrees of the trees we plant. Those who plant trees should know that, with a little care in choosing the right sort of trees, grown from seed of proper source, we can



oftentimes obtain faster growth, straighter, smoother trunks, or more healthy trees.

A batch of tree seeds may be very uniform in appearance, may look just like "peas in a pod," but the resulting trees may show as many variations as there were pollen grains which fertilized the mother flowers. Variability may be of several types. There is the variation traceable to differences in size of seed, which is influenced by such things as age, size, rate of growth, and dominance of parent trees. Seed size affects rate of growth of seedlings, and may be related to other characteristics which do not appear until the trees are older. Certain characteristics such as straight or crooked stems, broad or narrow crowns, large or small limbs, seem to be passed from parent to progeny through the seeds.

There are other differences which may be traced to geographic and soil races of trees. For example, it was found in Europe that seed from low-altitude larch produced failures in higher altitudes, because the needle growth continued so late in the fall that early winter freezing killed back the new growth; and seeds of high altitude larch, when planted at low elevations, produced unsatisfactory trees. In this country, green ash in the Plains region shows differences in drought resistance, correlated with drought occurrence in the locality of the parent trees. Time of bud bursting, and time of leaf dropping also vary. Even resistance to disease and to insect attack

may be inherited. Rate of growth and habit of fruit production have also been shown to be transmitted. Latex production of rubber trees, sugar production of maples, and resin production of longleaf and slash pines have been found to vary greatly between individuals.

These catalpa plantations stand within a stone's throw of each other, and demonstrate clearly how imperative is the selection of seed to get desired results—the right trees on a given soil

Perhaps many differences in results in planting are due to the existence among trees of geographic races, or soil races. A geographic race is a strain of a species which, through the centuries, has become adapted to growing under certain conditions of length of growing season, especially number of frost-free days, of temperature, and of water supply.

The importance of geographic source of seed has been studied both in Europe and in America. In one experiment, started in 1912, ponderosa pine planting stock was grown from seed collected from a number of different localities, grouped roughly into five regions, and planted at the Priest River Experimental Forest in northern Idaho. The young trees were measured and observed at regular intervals. It was found that the young trees developed many of the characteristics of their parents, but the most important point brought out was this: The best growth and development was found in the trees whose parents originated in climatic regions resembling conditions at Priest River. In other words, the parent trees had become adapted to certain

conditions, and they transmitted to their progeny this adaptability to similar conditions.

In another study, Douglas fir seed was collected in thirteen localities in Oregon and Washington. These parent trees included young and old ages, good and poor site quality, open-grown and crowded stand conditions, fungus-infection and absence of fungus, and low and high altitudes. The seeds were sown in the nursery and the seedlings grown from them were planted in four localities and at four different altitudes, all within the commercial range of the Pacific coast form of Douglas fir. An analysis of records of measurements and observations showed that the age, site, growing space, and fungus infection of the parent tree did not influence the growth of the progeny. But stock from high altitude

seed produced under different growing conditions.

Parallel results could be described for a number of other species. There is, for example, evidence to show that geographic races exist in red pine, northern white pine, green ash, black locust, honey locust, white spruce, American elm, northern red oak, and black walnut, and probably other tree species.

Our present knowledge may be summed up by saying that the importance of geographic races has been demonstrated and that there is evidence that some of our native trees possess varying characteristics of form, structure, disease resistance, and other factors which may be transmitted, through the seed, from parent to offspring. This knowledge is more and more guiding present and future planting programs.

For example, the directing policy in national forest planting today is that "so far as practicable, the seed sown will be from trees growing under climatic conditions similar to those on the area to be planted with the resulting stock." There are twenty-seven national forest nurseries in eighteen states, the annual production of which amounts to more than 160 million trees, including upwards of twenty-five species. The area served by a single nursery often is rather large, with considerable variation in elevation of the planting sites. Under these conditions it is necessary to use care in selecting the proper sources for the tons of seed used annually.

In some cases, severe restrictions are clearly indicated, and are in effect. For example, longleaf pine seed from Choctawhatchee National Forest in western Florida is never used for production of stock

to be planted on the Conecuh, less than fifty miles to the north, because the Choctawhatchee longleaf pine grows on extremely poor deep sands and mature trees are scrubby and slow growing. So seed for production of stock for the Conecuh is collected from good quality stands in southwestern Georgia.

On many western national forests, planted trees must struggle along in poor soil, at high elevations, or fight for life with a dense mass of brush. Under such conditions it is essential that great care be used in planting. Usually, the crop must be grown to saw timber size, that is, to age 100 or more, before it can be marketed. It is evident, therefore, that careful seed selection is essential. For most species, the only course definitely known to be safe is the use of local seed.

In the Pacific Northwest, thirty years' experience with



Scotch pine in Minnesota. Rapid growth but crooked stem on the left—a tree of central European origin, and slower growth but good form on the tree of Norwegian origin, on the right

parents did poorly on the coastal hills and was much above average at the high altitude plantation, whereas a stock from the coastal hills was above average in the coastal plantation. The lesson is that altitude is of primary importance in choosing seed for the production of planting stock of the coastal form of Douglas fir.

A study of loblolly pine in plantations near Bogalusa, Louisiana, showed differences in height growth and disease infection. Trees grown from seed produced near the planting site grew better and had less gall rust infection than those produced from seed from more distant sources, such as Arkansas, Texas and Georgia, although it is probable that in those localities local seed would produce better plantations than would Louisiana seed. All of these studies tend to show the superiority of the progeny from local seed sources over trees grown from

plantations of Douglas fir have shown material differences in trees grown from low altitude as contrasted with high altitude seed sources. For these reasons, great care is used to segregate seed and the resulting planting stock and to plant each lot of stock in a suitable location.

Nor is the recognition of these differences confined to governmental agencies. Some seed dealers in the Northwest segregate Douglas fir seed (and other species as well) by altitudinal zones, and are prepared to certify origin to prospective customers. As the importance of this matter becomes more generally known, the need for care in collection, handling, and use of tree seed will become more and more apparent, and will be reflected in customer demand.

The Prairie States Forestry Project planting is done on private lands, as contrasted with that accomplished on the national forests. This discussion, however, should not be closed without reference to the excellent seed practices followed in that work. A definite seed policy has governed from the start of the project in 1934, when seed source zones were established. The zones are based on similarity of climatic conditions. They average about 100 miles north and south and extend from 100 to 200 miles east and west. Seed of both native and introduced species is collected or purchased in these zones and accurate records are kept, by lots. It sometimes becomes necessary to move seed or planting stock outside the zone of origin, but care is exercised to avoid long moves, and seldom, if ever, will such a transfer extend further than the zone immediately to the north or south of that in

which the seed originated. Such practices seem basic to success in this region of severe and variable climatic conditions.

Steps which can and should be taken to aid present and future tree planters and harvesters may be summarized as follows:

Only seed and nursery stock of known origin should be used in forest planting.



Between the taking of these two pictures of a Ponderosa pine plantation in Colorado, sixteen years elapsed. Had the wrong seed been used unknowingly, the mistake would just begin to be showing up. So know the source of your seed before planting



Accurate records should be kept of the origin of all seed and nursery stock, and of the source of seed used.

A statement of origin should be required for all seed and nursery stock purchased, to be backed by definite proof which is satisfactory to the purchaser.

Local seed (grown in a similar climate and usually within 100 miles of the planting site, and differing from it by less than 1,000 feet) should always be used unless seed from other sources (Continuing on page 523)



TREE MEMORIES

By

W. L. McATEE

Boyhood memories cluster round the majestic beech, and the silvery gray sheen of its cool, smooth bark which seems to illumine a wood of beech

L. R. Koenig

● IT IS only natural that boyhood memories of trees should center about those that yield food and drink. While gratification of the inner boy doubtless was the main impulse toward early tree acquaintance, memory

now, after a lapse of many years, clings more fondly to settings and impressions than to feasts.

As part of the feasting, there may be mentioned beech-nuts which always filled our pockets in season and were

AMERICAN FORESTS

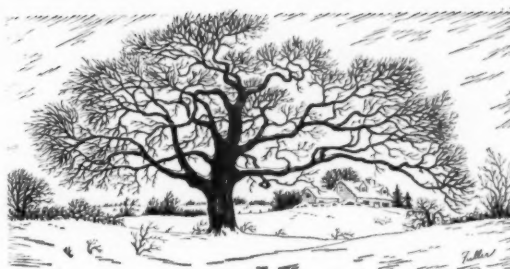
munched steadily without the least interference with our regular meals. At school the not entirely suppressible cracking of the shells between our teeth led to "incidents," as the diplomats say, the settling of which usually involved surrender of the contraband. Another comestible product of the beech was the young leaves which we chewed for their mild sourness. While the tree gave us salad and nuts, nevertheless, I now remember it better for the feel and the look of its bark. That cool, smooth skin, which in receiving, seems to return, a caress; and its silvery gray sheen which makes a beechwood more luminous than others, whether by day or by night. Then once there was a playhouse in a beech, a retreat from the things that were, a place where one could think or try to think, however disconnectedly and inconclusively, about the way of the world as it then appeared. That rude refuge gave unsupervised freedom, the boon most prized by everyone. There was a constructive world as one wished it, and though short-lived, it could at every need be built again. Dream worlds—who does not have and enjoy them? When I recall mine of early years in the beech, I would fain have another home in a tree to shelter me until the end.

The gathering of beechnuts was too ordinary, too casual, to be regarded as real "nutting." It required no preparation, no expedition, such as did successful gleaning of a worthwhile lot of walnuts, butternuts, or hickorynuts. And who does not know that the real joy of nutting is the planning, then the journeying and garnering, and later the curing and storing of the crop? But best of all the going and the doing, the walk or ride through the crisp autumn air, the festal colors of the remaining leaves and the rustling of the fallen—just being with the trees.

How I marvelled at the size of walnuts and hickories in a piece of virgin timber so marked in popular esteem as to be called "The Woodland." Seeing such mighty boles, clear of limbs to so great a height, both awed and fascinated me, but never having seen their like again, I must now go to records in books to be assured that such giants of their kinds really did exist. There I sensed the primeval forest in its grand and unforgettable qualities.

In such woodland, needless to say, we did not climb the trees but, perforce, waited for frost to drop the nuts. In lesser growths climbing was feasible and we often reaped the crop before it had fully ripened. Among the best nuts were those of the shagbark hickory, and the difficulty of harvesting them by climbing can be known only to those who have had the experience. The bark plates of the shagbark are tough, springy, and firmly attached at the middle, but loose and flaring outward at both ends, so that getting down the trunk was almost as difficult as climbing up. Well remembered is one rash assault upon a shagbark with a suit of overalls as my only clothing. The overalls were torn past further usefulness, and the skin did not entirely escape blemish! Such experiences teach the value of the capacity for regeneration; my overalls lacked it and perished long ago—my skin had it and is still going strong!

Hickories are flexible trees and sometimes in the top of a tall one the climber finds his perch blown over so that there is nothing between him and the ground but the thin and unsupported air. This merely adds to the exhilaration of the occasion. Sloping or nearly horizontal limbs too large to be gripped, and therefore a hazard in climbing, are characteristic of old black walnut trees grown in the open. From one of these I slipped one day when alone. The height was great enough to permit



me to turn in the air so as to strike the ground feet first, but with such momentum that every spring and hinge in my frame collapsed and my chin came down on my knees with a thump which certainly made "reason totter on her throne."

In our nutting vocabulary we had a term "bullnut" for especially large hickorynuts. We thought them a different kind, but I now realize that they were only the sparse but extra well-nourished crops of vigorously growing young trees. We gathered haws, the fruit of thornapples, as large as ordinary crab apples. Often we purposely sought the particular trees that bore them, filled our shirts with the fruits and ate them on the way home. I am certain they were haws because they had the right taste and they were red; all of the native crab apples of that region are green or yellowish green at maturity and not pleasant to taste.

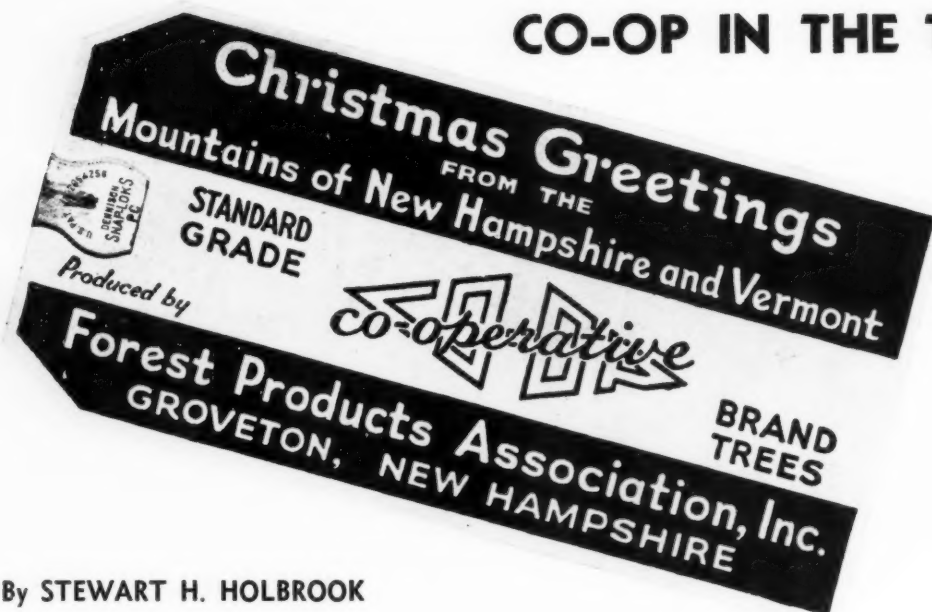
A large native or red mulberry tree branches widely like an elm. In these we shared with the birds the luscious fruit, for which they were so eager that they practically disregarded us. The mulberries were rather long, often curved, and bristly looking, strongly suggesting caterpillars. We often wondered whether that made them more attractive to the birds; as to our own appetites, the resemblance did not spoil them.

No mention of the tree fruits of that region would be complete without the papaw. Toward frost time we could shake down the fruit, some as large as a good-sized potato. We thought them mighty good then, but now in the light of larger experience I know that their smooth, green skin, golden pulp, and lustrous, brown seeds, mark a fruit that for sheer deliciousness is unsurpassed.

Neither pulpy fruit nor nut was another tree product that we patronized—the beans of the Kentucky coffeetree. They were almost as hard as flint. When roasted and cracked, they afforded fragments of whitish edible flesh, but in the center there was a little green ball, scrupulously rejected as poisonous. Only when one grows up to be a scientist does he learn that the little green ball is the embryo of the coffee bean and is not deadly. It has been said that the Kentucky coffeetree has nothing to recommend it for ornamental planting. I question this, and so do many others judging from the large number one may see growing. It has one unusual qualification, its rather large pods. These hang all winter, suggesting birds perched in the tree. Not only is this in itself an ornamental feature, but the suggestion it conveys evidently is not restricted to man. Birds going about in small flocks apparently decoy to these pods.

In the great and valuable group of pod-bearers that we utilized in our own way were the locusts. We nibbled the edges of honey locust pods for their sweet greenish pulp, not knowing they would some day be found to carry as much as a (Continuing on page 524)

CO-OP IN THE TIMBER



By STEWART H. HOLBROOK

UNTIL quite recently the only group of people in New Hampshire ever to achieve successful co-operation in the marketing of forest products were the soft-spoken and other-worldly Shakers. Most of the Shakers are long since dead, but in Coos County, New Hampshire, and in neighboring Essex County, Vermont, some 200 farmers are struggling against native individualism and outside economic forces to keep alive what is known locally as the Essex and Coos Co-Op.

The official title of the co-operative is the Forest Products Association, Inc., with headquarters at Groveton, New Hampshire, on the banks of the swift flowing Ammonoosuc. Organized late in 1935 by K. E. Barraclough and C. S. Herr of the New Hampshire Extension Service, the group has had the ups and downs of most such ventures. It has been damned more than once by some damners of note, who have included the two pulp manufacturing concerns of the district, and by the mem-

bers themselves, who are half loggers as well as farmers and therefore able to express themselves forcibly.

The original idea of the co-op was to market only pulpwood. Farmers of the area were in desperate straits in 1935. Milk prices were lower than ever. You couldn't give potatoes away. That left nothing but what could come from the forest.

Now, it takes money—advance capital—to get much out of a forest, and nobody seemed to have any money. The co-op's organizers petitioned and received from the Resettlement Administration the use of a loan to finance the pulpwood producing land owners. The co-op then secured contracts from the two pulp companies to accept Association wood at an agreed price.

Some seventy-five farmers went ahead and cut nearly 6,000 cords of pulp. This was far short of the amount contracted for, and the companies charged the farmers with breaking their contract.



Pulpwood at the Groveton Company's mill, most of which was delivered by the Forest Products Association

It now looks as if the farmers had failed to produce because of a very understandable reason, in fact, an attitude that might well be copied by far more Americans than are likely to do so! To get in on the pulpwood deal as set up by the Resettlement Administration, a farmer was obliged to apply for relief, to show that he was in dire financial circumstances.

Yankee farmers have as many faults as the next man, but lack of pride is not among them. They said in effect, and regardless of their actual condition, to let the Resettlement outfit go hang. They refused to pulp if they must also admit that they might otherwise starve.

In addition to the 6,000 cords of pulpwood cut during its first year, the co-op cut and shipped twelve carloads of Christmas trees, breaking about even on this item. The Resettlement Administration dropped out, turning financial control of the co-op over to the federal Forest Service. The board of directors hired a new manager, a man with thirty years' experience with co-operatives in the Lake States. This chap was nothing short of a whiz. With a gift of oratory not far less than that of the late Dan'l Webster, the son of New Hampshire who argued even the devil down, the co-op's new manager held a number of sizzling meetings among Coos-Essex farmers. Never was more enthusiasm felt or seen in that skeptical region. The new co-op head, farmers recall, pictured a veritable heaven, where farmers would have four crops a year from their timber—sawlogs, pulpwood, Christmas trees and Christmas wreaths. What is more to the point, the farmers would set the prices for their products.

The co-op manager got permission from the Forest Service to allow a loan of not more than \$200 to any



The farmer, cutting his logs for delivery to the sawmill. These logs are cut in the winter months and trucked to the mill, where the farmer gets full payment when the logs are delivered

individual producer, secured only by an unendorsed promissory note—the kind of note most borrowers prefer, but can't get. Then he went ahead and proposed to the two manufacturing concerns a contract to deliver 20,000 cords of pulpwood, which is a powerful lot of pulpwood for 180 farmers to produce.

The idea of the manager at this time, as seen in perspective, was that the co-op should corner the local pulpwood market and make the two companies pay right smart for the product. Farmers were behind the idea almost to a man. The two companies were rather bitter about the whole thing, and possibly just a bit scared. In former times, a pulp company in Coos and Essex counties always set its own price and paid for its product when it pleased.

But, new times, new ways. One of the companies gave in. The other held out for a long time. The farmers held out, too. When its mountain of pulpwood became a mere pile, the recalcitrant company signed on the line, agreeing to pay a margin of fifty cents a cord above what the co-op paid its members on the going market. This was for rough wood. A bit later the companies signed with the co-op for peeled pulp at a price \$2.50 a cord above what had been the market price for two years previously.

Sleds came down off the rafters of barns, as men swamped roads into the back forties of more than a hundred farms. No such pulping had been seen since the old Connecticut Valley Lumber Company had quit a decade before. Horse bells jangled throughout the winter of 1937-1938, with the result that co-



Typical of the pulpwood cut and piled in the woods, on which the co-op advances the farmer money to finance his cutting operations

op members considerably overcut the contract. In the meantime, what was known as the recession had set in. Its existence was unknown to the farmers, and unknown also to the co-op's enthusiastic manager, until the debacle of the Christmas trees and wreaths. Here is a sad, sad story, one that will be told and re-told to generations of up-country boys and girls.

The co-op manager told the farmers, and the wives of farmers, that a mint of money was to be made out of pretty wreaths of balsam fir, made by the women in their spare time. It was a startling source of unexpected income. So, throughout November and well into the festive month, several hundred Yankees—mothers, sons and daughters—returned to first principles of Yankee industry—that of the kitchen. Instead of hand-wrought nails and Yankee notions, as in the old days, they sat around the kitchen table and wove thousands of branches of pliable fir into thousands of pretty fine looking wreaths, as handsome as holly and a heap more aromatic. Meanwhile, the men of the families were up in the pastures, selecting firs and even spruces for Christmas trees, cutting and delivering them to the co-op, where they were graded and bundled.

Well, it wasn't much of a Christmas that year, in the Middle West where the trees and wreaths were shipped, and it certainly wasn't much of a Christmas in Coos and Essex counties. The co-op lost its shirt and pants on the venture. Some of the women report that they received as much as one-half cent each for the wreaths they made, but more never got a penny at all. The Christmas tree deal was little better.

But there was the pulpwood, which might have been all right if the companies hadn't heard about the recession. But they had, and they were in no hurry at all to accept the more than 20,000 cords the farmers had cut in their enthusiasm. Worse, it soon appeared, the co-op's contract did not specify that the companies should pay any interest on defaulted payments, so there was no penalty. The co-op had already loaned much of its working capital of \$100,000 to members for operating purposes. It looked like a dead end street for Forest Products Association, Inc.

At this period the enthusiastic manager of the co-op was given an opportunity to resign, which he did. The directors then engaged John Locke to take charge of what looked as much like an omelette as a going concern. Locke took over his duties in October of 1938. Born in Stewartstown, New Hampshire, Locke educated himself in engineering. After several years on railroad construction in the West and more work with the United States Coast and Geodetic surveys, he returned to Coos county in 1912 to become logging engineer for the Connecticut Valley Lumber Company. When the CVL ceased logging in 1927, he became manager of the New Hampshire-Vermont Lumber Company. In 1932 he

joined the CCC as superintendent of camps in West Burke and Brunswick, Vermont.

John Locke probably knows at first hand every acre of timberland in both counties. He also knows every farmer. Highly important is the fact that he is a native, with a good, broad A, and that he is known as a square-shooter. Farmers up there have every confidence in his ability and honesty. His first attention was given to reducing operating expenses of the co-op. This he did in many small ways. He gave some attention to markets. Last fall the co-op sold twelve cars of Christmas trees at a handsome profit. The co-op contracted with a local veneer company to deliver 2,500,000 feet of hardwood logs and 200,000 feet of softwood. At present writing this contract appears to be well on its way to being filled, at very satisfactory prices, by December 1, 1939.

Here is one of the most important things the co-op has done. J. H. Morrissey, manager of the veneer company, says that his concern and

its 160 employees would be inactive today were it not for the fact of the co-op's regular and orderly supply of hardwood timber. He can get his logs when he wants them, with no waiting. The farmer-woodlot owners get their checks the same way. The \$100,000 fund granted the co-op — and once nearly used up—is now revolving in a fairly satisfactory manner to finance both pulping and hardwood logging.

Currently Manager Locke and Extension Forester Barraclough — one of the co-op's founding fathers—are trying to get permission of the Forest Service to adopt a new set of by-laws. These proposed regulations, drawn up by co-op directors, would permit the group to issue and sell shares to members, each member to accept a minimum of one share — par \$10 — no member to hold more than five per cent of the shares authorized. Further, the proposed by-laws would permit the co-op to lease or purchase

timberland, equipment and a processing mill. As this is written the proposed reorganization is being studied by government attorneys in Washington.

What the next chapter in the Forest Products Association will be depends almost wholly on its members. Since its inception it has done a gross business of more than \$500,000. More important is the fact that it has taught the most rugged individualists on earth that co-operation can be made to pay. It has had only about half a chance to date, but the air seems to be clearing.

Directors of the co-op, and many of the other members, are convinced that what they need is a local processing mill, where timber can be turned into various items ready for the consumer, or rather for the ultimate processor. They realize that an isolated co-op, dependent on two or at most three concerns to take its pulp and hardwood, is in a precarious position.

The co-op's directors have an eye on a sawmill that they think can be bought for (Continuing on page 523)

THE DESTROYERS

*With roots held to the heart of earth
With branches to the sky,
The forests watched the calm years pass
Into Eternity;
Time gave them growth of sturdy worth
Storm gave them peace of rain
Sun warmed each sapling to its task
Till came the frost again.
Good gifts are these for man's wise care
With seeds for sons of these,
"Alas, how do they take the trust?"
The wind cries in the trees.*

*With hands tense from the grasp of gold
With hearts cold from its greed
Man lives his brittle span of years
Man chants his shameless creed:
"Live for today, today is ours,
Make the earth yield its toll,
The future is not ours to reap
So rob tomorrow's soul;"
The hills lie bare, no seeds for growth—
Fallen the forest trees
And winds, haunting the lonely space
Mourn for the sons of these.*

—EDITH LIVINGSTON SMITH.

EDITORIAL



ABOUT MEN AND FLAMES

OUT IN Wyoming, near the historic little town of Cody, the federal Forest Service and the American Legion on August 20 dedicated a magnificent memorial to the fifteen men who in 1937 lost their lives in the tragic Blackwater fire on the Shoshone National Forest. At the same time the American Forest Fire Medal for Heroism was presented to Bert A. Sullivan, of Cody, for heroic action in saving the lives of forty CCC fire fighters during the Blackwater blaze. Similar medals for identical acts of heroism were presented to Forest Ranger Urban J. Post, of Buffalo, Wyoming, and, posthumously, to CCC Foreman Paul E. Tyrrell, of Oakland, California, last March at the time of The American Forestry Association's national forest fire prevention dinner at Washington, D. C.

As great and as deserving as this tribute is to these heroic men of the fire line, it is no compliment to the American way of thinking to learn that the back-drop for this massive stone monument at the time of the dedication was a billowing cloud of fire and smoke—a cloud that spread practically unbroken from the Rocky Mountains to the Pacific Coast. There is no moral satisfaction in honoring the dead in Wyoming when the ashes of five new victims of the flaming forest are cooling in Nevada, this number having been lost on the fatal Toiyabe fire of July 28. It may be true that the fifteen men who lost their lives in the Blackwater and Toiyabe tragedies were victims of the freakish circumstances dictated by elements which no man could foresee or prevent. But it is equally true, and tragically so, that the fires roaring through the forests over a far-flung front at the time the nation was paying tribute to the Blackwater dead were, to a great extent, the result of the American public's continued disregard for fire as the great destroyer of its forest domain.

The most extensive of these was the Tillamook fire in Oregon, which started on August 1 and was still burning as this is written. Conservative estimates are that 200,000 acres have already been burned over, despite the efforts of 3,000 fire fighters and modern methods of forest fire suppression. That the Tillamook country, the entire West in fact, was extremely dry during July and August no doubt explains the severity of this fire.

If American citizens were unaware of the facts surrounding forest fire prevention and control, the Tillamook and other fire tragedies could be charged off to ignorance. But this is far from being the case. For the past fifteen years forestry and conservation agencies the country over have made it their business to familiarize the public with every aspect of the national forest fire picture and to enlighten every man, woman and child as to how he or she may contribute to its betterment. The American Forestry Association, as one of these agencies, has since its

creation more than a half century ago devoted a large part of its funds and energy to building a nation-wide fire prevention sentiment. Its \$200,000 campaign in the South ten years ago is a matter of conservation history. Within the past ten months, to look at the present, it has sponsored a national forest fire prevention rally in the nation's capital in order to stimulate greater congressional as well as public interest; it has printed and distributed many thousands of copies of a special issue of *AMERICAN FORESTS* devoted to forest fire prevention in order better to inform the public of specific fire prevention needs; it employed the celebrated artist, James Montgomery Flagg, to paint a special forest fire prevention poster, and cooperated with the federal Forest Service, state and other forestry and conservation agencies, in the distribution of more than a million copies to every corner of the nation; and finally, it made available a million poster stamps reproduced from the Flagg painting for nation-wide distribution. Other agencies, including the United States Government, have been working just as specifically toward gaining public support in the prevention of forest fires.

But reports still come in of great and devastating fires caused by thoughtless and careless acts on the part of otherwise good American citizens.

So, Mr. and Mrs. Citizen, it is beginning to appear as though the issue is squarely up to you. You can conserve your life-sustaining resources of forests, soil and water by the application of knowledge you already possess, or you can reduce them to ashes and oblivion by continuing the habit of careless indifference to fact. If you conserve, you gain in health, wealth and security. If you burn, you endanger not only property and life, but ideals as well. No country on earth affords greater freedom of thought and movement than our own. This is partly because our continent is vast, spread out, uncrowded, and partly because its magnificent resources are for the enjoyment of all of its people. When you put the torch to these resources you attack the very structure of our democratic life. Every grove you burn means just one less opportunity for rest, for meditation, for companionship; every mountainside you blacken deprives us of beauty and inspiration and spiritual expansion; every stream you pollute with ash reduces sportsmanship among our people.

You know all of this, Mr. and Mrs. Citizen, but you are not in the habit of remembering what you know at the right time and place. Perhaps you need to come a little closer to the situation. Then do this—picture yourself as related closely to one of the fifteen men who perished in the Blackwater fire and whose heroism is being remembered on a little blackened hill near Cody. You will find that it makes a difference.

OSAGE-ORANGE

Maclura pomifera (Rafinesque) Schneider
(Synonym: *Toxylon pomiferum* Rafinesque)

By G. H. COLLINGWOOD

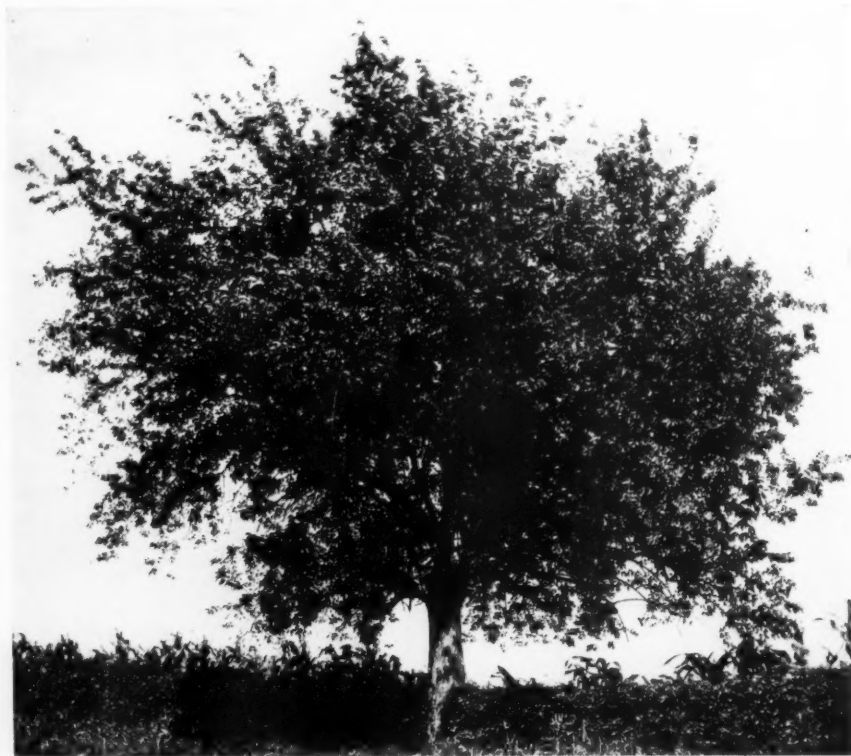


Maryland State Department of Forestry

ORIGINALLY confined to the rich bottom lands of the Arkansas and Red River Valleys in the region inhabited by the Osage Indians, the hardy, drought resistant qualities of Osage-orange, its adaptability for hedges and wind-breaks, and the varied uses of its wood have so widely encouraged its planting that it is now found growing throughout most of the country. It is usually a small, thorny tree with a crown of irregular, ragged contour. It reaches heights of fifty to sixty feet, with a short, stout, early divided trunk which is seldom more than two to three feet in diameter.

The glossy green leaves are simple and arranged alternately on the twigs. They have smooth margins, are three to six inches long and two to three inches wide, generally egg-shaped but terminating in a slender point. The slender leaf stem or petiole is one and a half to two inches long. When either this or the leaf is broken a thick juice exudes.

The stout, tough branchlets are centered with a thick orange-colored pith, and the pale bark is marked with pale orange lenticels. Short, stout, straight spines arm the twigs. Greenish clusters of tiny staminate and pistillate flowers develop on separate trees in June. By late summer the pistillate blooms are noticeable as yellowish



Above: Gnarled branches ramify from a short trunk to form a low, ragged crown

Left: Osage-orange trees are usually small, but may reach heights of fifty or sixty feet with a low irregular, spreading crown

Maryland State Department of Forestry

green balls which become three to five inches in diameter before maturing in the autumn. These are compound fruits, like those of other members of the *Moraceae* or mulberry family, of which this and the fig are members. The coarse, fibrous texture and sticky, bitter, milky juice makes these fruits unpalatable for man or beast.

The orange-brown, shreddy outer bark is scarcely an inch thick. It is irregularly divided by deep furrows. The dark orange inner bark and the lemon colored sapwood were used by the Indians to dye their blankets. More recently it has been a source of yellow, tan and Khaki dyes, as well as of tannin in the treatment of leather.

Heartwood as well as sapwood is bright yellow, but the former turns brown on exposure. It weighs about forty-eight pounds to the cubic foot when air dry, is stronger than white oak, but not so stiff, and very hard. Because of its durability in contact with the soil, material of suitable size is used for fence posts, railroad ties, and cabin supports. In the horse and buggy days the hubs and rims of wheels for farm wagons were made of Osage-orange. Pulley-blocks are now made of it, but perhaps its most specialized use is by modern archers, who, like the early Indians, prize the flexible wood of straight clear-grained specimens for the construction of bows. Thus the name *Bois d'Arc*.

Although seldom used for shade or ornamental purposes, Osage-orange was, before the widespread use of wire fences, so generally planted for hedges as to be commonly known as "hedge plant."



Clusters of greenish pistillate flowers among the glossy green foliage of early summer. The leaves are three to six inches long with smooth margins and attenuated points

Devereux Butcher



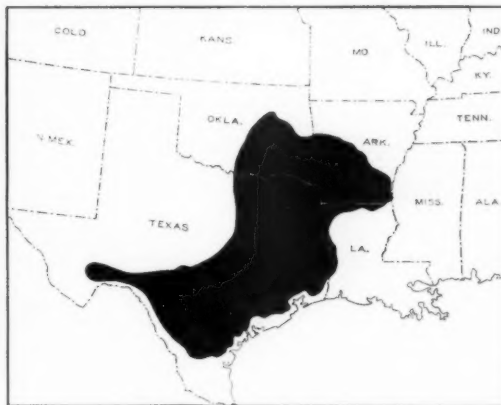
Devereux Butcher

This immature compound fruit will reach three to five inches in diameter. The name Osage-orange recognizes the resemblance of this fruit to an orange and the tree's relation to the Osage Indians



G. J. Baetzhoid

The rough shreddy outer bark is dark orange-brown and scarcely an inch thick



Original range of Osage-orange

Conservation Over the Dam

(Continued from page 491)

The first ship passed through the waterway in 1800. In the fifty years it was operated it did a flourishing business, the peak year being 1830, when 750 boats passed through its locks carrying principally farm products, of which 79,000 bales of cotton constituted the major load. The coming of the railroad in 1850 sounded its death knell. Nevertheless, the desire for cheap water-borne traffic persisted and in 1913 the Columbia Railway and Navigation Company established a line of shallow-draft steamers operating between Columbia and Georgetown on the Santee and Congaree rivers. In 1928 the federal government completed the section of the Intra-Coastal Waterway between Georgetown and Charleston, forming an excellent coastal feeder between the two cities in connection with river waterways to interior points; nevertheless it has not been utilized to a great extent, the reason given being the inadequacy of the river routes to the interior.

Along about this time the Columbia Railway and Navigation Company conceived of a power development plan in the Santee-Cooper area and a license was granted the company by the Federal Power Commission, a section of which required that ten-foot navigation between the two rivers—the Santee and the Cooper—be provided. Several attempts were made by the company to finance the project with PWA funds but without success, and in 1934 its properties and rights were acquired by the South Carolina Public Service Authority.

The Authority and every one else admits there is no real flood control problem on the Santee, but the project is designed, by means of its dams and reservoirs, to reduce flood frequency and severity in the Santee delta.

The whole Santee-Cooper plan is based on the ability of engineers to back up the waters of the Santee by means of an earth dam of tremendous proportions. As previously stated, an amazing number of people argue that this cannot be done, especially by July, 1941, and with funds available for its construction. They see in the attempt, therefore, an enormous waste of money and resources. Chief argument against the project is that a limestone stratum underlies the immediate Santee basin and that this stratum contains too many sink-holes and underground streams to support an eight-mile-long earth

dam. The same argument is presented by critics in connection with the two-mile-long Pinopolis dam.

So that the reader may have a clearer picture of these two giant structures, it may be well to present close-up views. The Santee dam, about eight miles in length, will have a maximum height of forty-five feet, according to Kenneth Markwell, project engineer. "It is to consist of a pumped sand-fill portion about 23,000 feet long, on the north side of the river; a spillway 3,400 feet long at the river, and a rolled earth fill portion about 16,000 feet long extending from the south end of the spillway to the south abutment. The spillway will be of reinforced concrete, equipped with steel crest gates and operating mechanism to regulate the Santee lake level for power and navigation purposes. It will be capable of discharging safely a possible maximum flood of 800,000 cubic feet a second, more than twice the greatest on record.

"The Pinopolis dam will be about two miles in length, and will consist of two rolled earth fill sections between which will be constructed the reinforced concrete power station and the navigation lock. The maximum height of the dam will be seventy-three feet."

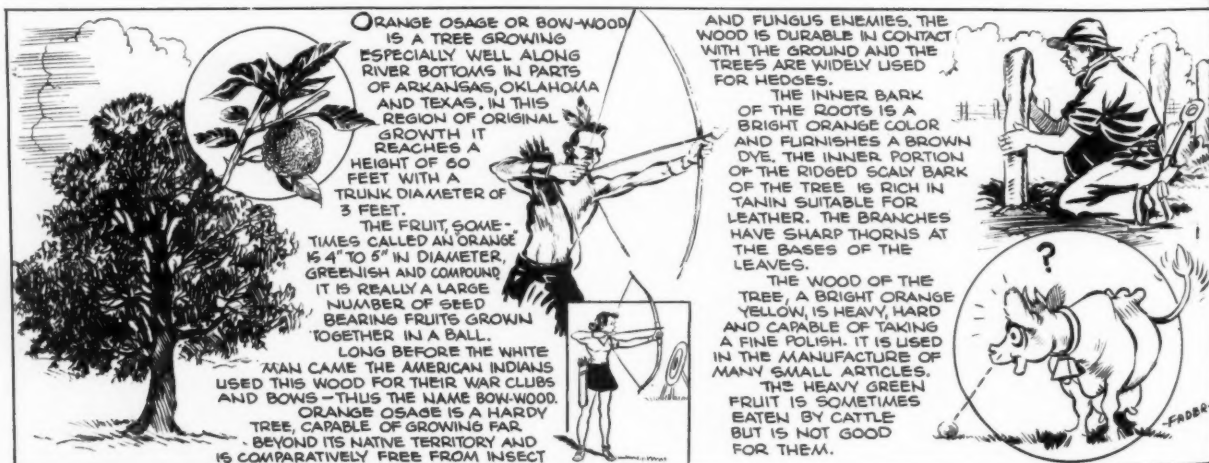
Will these mammoth structures hold? The PWA is convinced they will, basing this belief on studies made by their engineers. Quite naturally, the South Carolina Public Service Authority believes they will, and here is the reason why:

Before any work on the Santee-Cooper project was begun, the Authority called into consultation recognized engineers who were given a free hand to examine natural and prevailing conditions and to offer criticism of the methods proposed for the building of the physical structures. They approved plans and methods.

The Harza Engineering Company is employed as designing engineers to prepare plans and specifications and to have general supervision over the engineering construction of the project. This organization, which came to South Carolina directly from the construction of the Loup River Project in Nebraska, has attracted to it the best available talent in the field and has secured for key places engineers of established reputation and sound judgment.

(Continuing on page 524)

TREES AND THEIR USES—No. 44—OSAGE-ORANGE



FECHNER CLARIFIES CIVILIAN STATUS OF CCC

"IT IS not possible under present laws for the Civilian Conservation Corps to be inducted into the United States Army as a body." In these words Robert Fechner, Director of the Civilian Conservation Corps, gave sharp denial to rumors that the European war may lead to the early militarization of the CCC.

"A CCC boy is a civilian, and remains so," declared Mr. Fechner. "In war time his status is that of any other civilian. Enrollment in the CCC is not enlistment in a military organization of any kind."

With this statement, Director Fechner concluded an address to the convention of the Sons of Spanish War Veterans at Atlantic City on September 11, in which he called attention to the fact that throughout its life the CCC has been maintained as a civilian institution.

"European nations," he explained, "have had labor camps somewhat similar to ours. In some of them some form of military training has been taught. In at least one nation the youth camps are maintained largely for pre-military training purposes.

"In the Civilian Conservation Corps," emphasized Mr. Fechner, "young men have been and are taught not military training, but self-discipline. While a young man in the CCC camps learns many things and gains bodily strength and health which would be of great value to him and to his country in event he ever went to war, he is not given any military drill or training of any kind. As a matter of fact present regulations forbid the teaching of military training in the camps.

"The young men come to the Corps as raw material from the cities or the country. It is immaterial to us," said the Director. "Each man has his own problems, of course; to us it is our problem to solve his, practically and satisfactorily, for our purpose is not only to rebuild forests and lands, but to build men. To gain that end a certain amount of organization is necessary within the camp. The perfection and execution of that camp organization helps to inculcate in enrollees orderly habits, neatness as well as ability and willingness to carry out work instructions promptly and intelligently."

In the course of his address, Mr. Fechner stated that during the past year the CCC has given employment for varying periods of time to approximately 450,000 young men. Three times as many would have been employed had capacity been available. "This government," he declared, "is still forced to choose between giving employment to several hundred thousand young men each year or allowing the youths to grow up without work and

without the work experience which they must have in later years to find jobs. So long as this condition exists we must have an organization like the Civilian Conservation Corps to fill the gap."

As on other occasions, the Director placed special emphasis upon the educational and training opportunities afforded by the CCC. He described how the young men secure a knowledge of how to handle a pick and shovel, a hammer and saw, and declared that frequently these are determining factors which are of value to the young men for the rest of their working life.

"For the past six and a half years," the Director reminded his audience, this nation has been engaged in a "war of reconstruction—not a war of destruction. It has been a war to make America strong by saving and building up her human resources and her highly valuable natural resources of timber and soil," he continued. "This struggle of which I speak was fought and is being continued on two economic fronts. On the one hand the Government, through the CCC camps, has striven to save an army of idle youth from the moral erosion caused by unemployment. To accomplish this end young men by the hundreds of thousands have been sent to outdoor camps in our forests and parks where they have been given jobs. * * * This army, in turn, has pitted its strength against nature in a tremendous battle to save our natural resources of timber and soils from the dangers of forest fires, tree attacking insects and dis-

eases, erosion and uncontrolled flood waters."

"As Director of the Civilian Conservation Corps program, I have not considered that the CCC's job was simply that of giving a boy employment which would take him off the streets. While enrollees have performed a tremendous amount of useful conservation work, I have not considered that getting work accomplished was our most important objective. Instead, I and all officials connected with this program have felt that our big job was to take the young man who came to our camps and help him become self-supporting. Our job, I have felt, has been to make physically fit, useful citizens. We want to turn out young men able and willing to make their own living. We want to turn out disciplined men who believe in our American institutions and who can satisfy the exacting demands of employers when they find jobs."

With this, he added, these young men have an unquestioned opportunity to build up their physical strength and health. This means, he concluded, that "this nation is a stronger nation because of the CCC."



ROBERT FECHNER
Director of the Civilian Conservation Corps

THOMOMYS THE ENGINEER--FRIEND OR FOE?

BY LEE R. DICE
University of Michigan

AN article in the October, 1938, number of *AMERICAN FORESTS*, entitled "Thomomys the Engineer," contains some statements and implications which are not supported by the scientific information about pocket gophers published up to the present time.

The author of the article in question, Dr. Ira N. Gabrielson, who is Chief of the United States Biological Survey, must not have consulted his scientific staff in preparing this article or he surely would not have stated that the pocket gopher "is accused, and sometimes with good reason, of both the direct and indirect destruction of thousands of acres of choice mountain meadows. . . ." Nor would he have implied that if only the pocket gophers could be removed (by the Biological Survey) erosion on the western arid lands would be largely prevented.

By his statement "destruction of thousands of acres of choice mountain meadows" Dr. Gabrielson evidently refers to erosion begun by pocket gopher activities, for he later states that "there are areas in the western mountains absolutely denuded of soil as a result of pocket gopher activities." Yet nothing is more certain than that *Thomomys* has been living in these mountain meadows for thousands of years, while the severe erosion which has taken place is very recent.

Is it not peculiar that in the photographs accompanying Dr. Gabrielson's article and depicting "erosion such as this—starting from pocket gopher workings in mountain meadows" no pocket gopher workings can be seen, but there are plenty of cattle? Dr. Gabrielson, of course, only implies and does not state that these particular erosion gullies were started by pocket gophers.

Actually the pocket gopher helped to form these rich mountain meadows, for the later destruction of which he is now blamed. Read what is said by Vernon Bailey, a retired member of the scientific staff of the Biological Survey, who has studied pocket gophers in practically every part of the United States where they occur, and who is the author of a revision of the classification of these animals. In a paper published by the Biological Survey in 1936 (*North American Fauna* No. 55, page 258), speaking of *Thomomys monticola*, a pocket gopher living in the mountains of Oregon and California, he writes, "The soil is kept mellow and porous, and a great part of the rainfall is held in the ground instead of running quickly from the surface in destructive floods. The meadows are enriched, the forests are benefited, and soil erosion, the menace of the mountain ranges, is largely checked." All the thanks the poor pocket gopher is to get for this work, if Dr.

Gabrielson secures the appropriations he seeks, will be a stomach full of poison.

T. H. Scheffer, associate biologist of the Biological Survey, in Technical Bulletin No. 244, published by the Department of Agriculture in 1931, emphasizes the fact that under natural conditions pocket gophers aid in building up fertile soil, and further states that "It is only in certain situations that pocket gophers are found on stock ranges in numbers sufficient to affect materially their value for grazing purposes."

From studies in the Jackson Hole country of Wyoming, O. J. Murie, one of the most able field naturalists of the Biological Survey, wrote in 1935, in Department of Agriculture Circular 362, that his observations "indicate that the pocket gopher is not here a factor in erosion."

Another member of the scientific staff of the Biological Survey, Dr. Walter P. Taylor, who is an eminent ecologist, in a general survey of the relations of animals to soils, stated in 1935 that "There seems to be little or no evidence of a critical character that rodents or other animals, under natural conditions, promote soil erosion."

No attempt has been made, so far as I am aware, in any scientific publication to refute these statements by the experienced scientists of Dr. Gabrielson's staff.

No detailed study seems ever to have been made of exact relations between rodents and erosion in mountain meadows. However, in a study made in the Boise River watershed by Renner, who was at the time a member of the staff of the Forest Service, it was found that rodents (mostly pocket gophers but including some ground squirrels) contributed to accelerated erosion on overgrazed lands. There was, however, no erosion on nineteen per cent of the plots on which there was heavy rodent infestation. Furthermore, sheet erosion was evident on thirty-four per cent and the more destructive gully erosion on nine per cent of the plots on which there were no signs of rodents. Certainly here the rodents were not the chief factor in the initiation of erosion. Renner states that "The erosion was found to vary directly with the degree to which the vegetation cover has been depleted and the surface conditions disturbed by the grazing livestock. Almost without exception, the areas which have been grazed most heavily are examples of the most severe erosion."

The ecologic and economic relations of pocket gophers and other rodents on wild lands are still but poorly understood, as has been pointed out by Bond and Borell in a recent paper in *Soil Conservation*. The lack of exact information about the relationship between pocket gophers and

erosion was still earlier pointed out by Talbot and Crafts in *The Western Range*.

It may be true that in some mountain meadows *Thomomys* has become too abundant for the good of the vegetation and of the soil. Theoretically it might happen if the animal's predators became too few to hold it in check. In his book, *The Wild Animals of North America*, Dr. W. W. Nelson, former chief of the Biological Survey, writes that pocket gophers are "persistently hunted day and night by foxes and coyotes" and are also taken in numbers by snakes, hawks, owls, and weasels. In Jackson Hole, Wyoming, O. J. Murie found the pocket gopher to be the second most important item in the food of the coyote, the most important item being the field mouse. Is it not possible that the destruction throughout the West of many coyotes and other predators by the control campaigns of the Biological Survey may result in excessive numbers of rodents in some areas?

Perhaps some of the smaller predators may be even more important than the coyote in pocket gopher control. Palmer and Shaw state in *The Western Range* that "in Colorado it is felt that weasel, if properly protected, would accomplish in rodent control as much as or more than the present poisoning methods." Would it not be well for the Biological Survey to investigate the possible use of other methods of wildlife control than the use of poison?

We are, of course, here talking about grazing and forest lands. On agricultural lands the pocket gopher and other rodents frequently become terrible pests, which must be controlled by any means possible. One can therefore understand the feelings of Dr. Gabrielson, who rose to be chief of the Biological Survey from a position in the rodent control work of the West.

Would it not be the proper procedure for a scientific bureau to investigate the ecology and economics of the pocket gopher on forest and range lands before asking for large sums of money to conduct poisoning operations? Is this not especially true when in the opinion of many zoologists the proposed poisoning campaigns are of dubious biologic or economic value?

If, after full and impartial scientific study, it shall be determined that poisoning operations against the pocket gopher on certain lands are necessary to prevent soil erosion, then by all means let an appropriation be secured. However, with the information at present available it seems that spending money for the large scale poisoning of pocket gophers in mountain meadows will be like pouring money down a rat hole.



Cutting a full 9-ft. width, 3 to 4 inches deep, with an International TD-35 Diesel TracTracTor and special fire-line plow. Lines like this provide fire protection and roadways for cars and trucks when needed. The plow cuts through roots of all kinds, including the tough palmetto.

Florida Fights Fire Before It Starts, with INTERNATIONAL TracTracTors

18 International TD-35 Diesel TracTracTors are doing great work in the forest-fire prevention program now being carried on by the Florida Forest and Park Service. This cooperative plan between the state and landowners is now one of the most effective of its kind.

Fire-line construction, maintaining and rebuilding lines, and plowing treeless areas for seeding to pasture, make up the principal work for the TracTracTors. The Service owns eleven of these units and cooperators the rest.

An example of the work they are doing is shown in the report on seven of them for the fiscal year, July 1, 1938 to July 1, 1939. In that time, these seven TracTracTors plowed a total of 5,728.4 miles in 3,829 operating hours, at an average fuel and oil cost of 13½ cents a mile.

The sandy soil is hard on track chains and other track parts, but the first two TracTracTors bought by the Service have averaged nearly 2,500 miles of fire lines with the original track rollers, sprockets, and idlers.

Take this as sound evidence that International TracTracTors have the stuff for your work. The nearby dealer or Company-owned branch will give you full details.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)

180 North Michigan Avenue

Chicago, Illinois



In open treeless spaces, where there is little likelihood of natural reseeding from cones, the land is frequently turned under with TracTracTors and this type of 7½ ft., two-section plow, at the rate of 30 acres a day. It is then seeded with carpet grass to supply livestock feed. The front section of this plow is also used to maintain and build fire lines.

INTERNATIONAL Industrial Power

Fire Strikes Again in the Tillamook

BY JOHN B. WOODS

In 1933 the Tillamook Fire swept over 277,000 acres in Northwestern Oregon, killing nearly thirteen billion feet of merchantable Douglas fir, cedar and hemlock.

Within that area, only 25,000 acres of green virgin timber survived. The number of ownerships, large and small, complicated efforts to organize salvage operations, while extremely rough topography and lack of highways necessitated extensive costly construction of rail and truck roads. By 1936, however, several rail systems were well developed and salvage outfits, combining steam and tractor logging, were engaged in a race with wood borers for possession of the larger trees. Less than ten per cent of the total killed timber volume had been recovered by mid-summer, 1939.

Twelve sizeable outfits were at work and had at least twenty million feet of felled and bucked logs lying in the woods when on August 1st, 1939, the fire fiend struck again. The crew of a logging contractor near Saddle Mountain in Washington County had left the woods at one o'clock after completing its daily "hoot owl" shift, when a donkey engine watchman discovered a blaze. He could not control it, so he called the crew which worked desperately under handicaps of falling humidity and strong varying winds. Other crews came into the struggle and for a week, logging operators fought their own battle stubbornly, employing from 500 to 600 men.

On August 7th, with the weather growing worse and the fire spreading southward and westward, the private patrol association, charged with protecting non-operating areas, moved in to help, taking over portions of the line on the east side and organizing special crews of expe-

rienced woodsmen to watch the particularly hazardous west side. The Forest Service, worried about its own Siuslaw protective area, mobilized men and equip-

Working frantically, the protection agencies managed to get word to crews and lookouts along the west side, so that none were cut off, although one of the latter

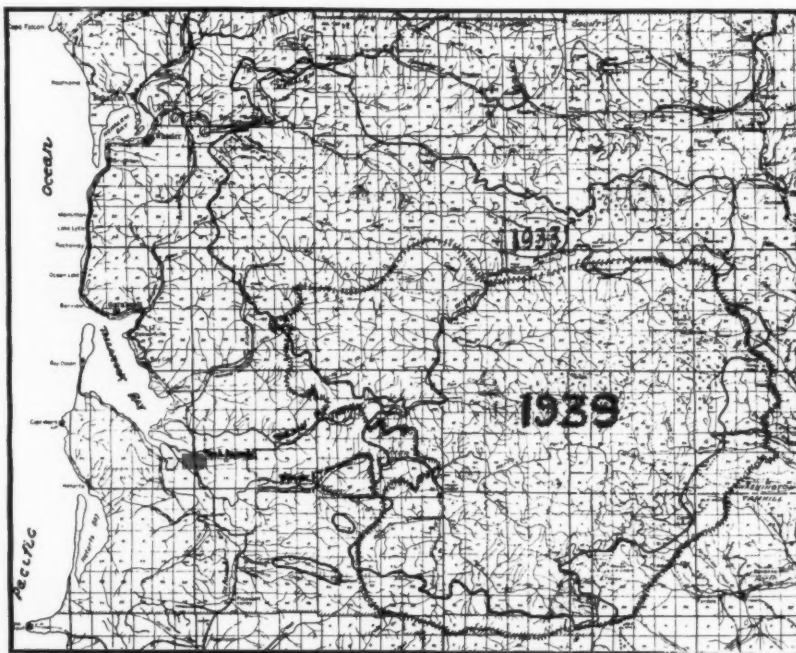
was obliged to run the gauntlet by swimming the river.

Sunday was nearly as bad; but by Monday, the east wind died down and a fog bank, which had hung along the coast, began to move inland. While this had no effect upon ground fires, it did lift the menace of further crowning in green timber along the western side.

On Monday, the Governor and State Forest Board of Oregon authorized a contribution of \$25,000 to aid in fire fighting; and the Federal Government expedited completion of a previously requested WPA grant, under which 4,000 men were mobilized to protect property along the roads and

rivers and to help hold the fire lines against a further outbreak.

The weather was now breaking and on the night of August 24th, widespread electric storms scattered rain up and down the Cascades, and incidentally set more than a thousand lightning fires in Washington and Oregon. The rains became more general and a period of cloudy weather has relieved the tension of practically all of the area west of the Cascades. This is a welcome break but, of course, it does not mean that there will not be more bad fire weather this season. It is too early to sum up the losses from this fire or the many other disastrous fires in the region. But it is not too early to estimate that the cost of fighting the 1939 Tillamook Fire has exceeded half a million dollars and will continue to mount so long as patrol crews must guard more than sixty miles of line.



The Tillamook Burn—in 1933 and 1939

ment along the southern boundary of the 1933 Burn. The State Forester drew heavily upon the central equipment pool to supply both operators and association forces, and watched closely. Responsible officers of all agencies flew the area constantly, but were unable to "check" progress because of smoke conditions.

This phase, characterized by losses here and successes there, lasted until early morning of Saturday, the 19th, when the dreaded east wind swept down the Columbia Gorge and blew across the area, carrying all fires westward. Flaming brands were sucked out of debris-filled canyons of the Wilson and Trask river systems, to spot new fires far ahead. In the city of Tillamook, where electric lights had burned for several days, and in some of the beach resorts, there now was a very real threat of fire from above. Settlers in the narrow valleys fled with what belongings they could pile in motor vehicles.

Government Adopts New Forest Seed Policy

As an aid in the long-time development of better American forests, the Department of Agriculture has adopted a nationwide forest seed policy for its various planting activities under which only locally produced seed of traceable origin will be used where practicable, and only seed from localities of similar climate and

altitude be substituted where use of local seed proves impracticable.

Ninety-five per cent of the nation's annual planting of around 250,000,000 trees is done by the Department or agencies co-operating with it. The Department hopes that the newly adopted seed policy eventually will become a national standard, ac-

cepted by all seed and nurserymen, with private as well as public planters refusing to buy or use any but "pedigreed seed" and nursery stock of known origin. It is reported that a number of seed dealers on the West Coast have been for some time certifying the origin of their seeds—particularly Douglas fir seeds—to purchasers.

The nation-wide policy became effective upon adoption in national forests—where the idea has been a generally accepted guide to planting for years—in the Prairie States Forestry Project—where it has been closely followed in the planting of field windbreaks—and in the erosion-control plantings of the Soil Conservation Service. In addition, all states, counties, cities, corporations, and individuals co-operating with the Department, chiefly under the Clarke-McNary Act, are being urged to accept and adhere to the policy.

Outside these agencies, including as they do national forest nurseries, which produce about 160,000,000 seedlings annually, the policy will affect seed collectors, dealers and nurserymen in widely separated sections of the country who offer seeds or nursery stock for purchase by the Department planting agencies.

Under the new regulations dealers will have to furnish evidence, such as bills of lading and receipts or business documents, in verification of the year and origin of each lot of seed or stock offered.

AXES FOR FORESTRY WORK VASTLY IMPROVED IN VALUE

BY

TRUE TEMPER

WORLD'S ACKNOWLEDGED LEADER IN FORGING, NORMALIZING AND TEMPERING FINE STEEL



● Today's TRUE TEMPER Axes set a new high standard in utility, finish, design and value. They are made from improved special analysis axe steel, forged by improved methods, normalized to develop extreme toughness and tempered to produce the finest cutting tool the world has ever seen. Finishes are attractive, practical, give maximum protection.

For catalog write

THE AMERICAN FORK & HOE COMPANY
CLEVELAND, OHIO, U. S. A.

TRUE TEMPER
TOOLS for the
FORESTER



Steve Hannagan Associates

TRAIL RIDERS

Mrs. Robert H. Jackson bids farewell to the Solicitor General and their daughter Mary—members of The American Forestry Association's expedition of Trail Riders into Idaho's Sawtooth Wilderness—prior to their departure from Sun Valley Lodge on the morning of July 18.

Seventeen Sawtooth Trail Riders, with representatives of the Forest Service, The American Forestry Association, and the packers, with seventeen pack horses had two weeks of sunshine and clear skies while riding a circuit of nearly 130 miles in the high mountain valleys and passes found in the primitive area of the Sawtooth and Boise National Forests.

Other members of the party included the Misses Eleanor F. Armstrong, Rutherford, New Jersey; Dorothy Bartol, Milton, Massachusetts; Helen K. Glaser, Butler, Pennsylvania; Helen K. Ketterer, Pittsburgh, Pennsylvania; Mildred J. Netsch, Buffalo, New York and Maude Louise Strayer of Dobbs Ferry, New York; Dr. Charles W. Harnsberger, Washington, D. C.; C. J. Olsen, Ogden, Utah; F. S. Moore, Hailey, Idaho; Claude W. Gillespie, Stanley, Idaho; Nigel Bois, New York, N. Y.; and G. H. Collingwood, Washington, D. C.

Possible War Influences on Forest Industries

That the European War will have far-reaching influences upon the American lumber industry is the opinion expressed by three industry leaders in a recent issue of the *American Lumberman*.

"Domestic demand will be stimulated, particularly in the farm areas, because of the practically assured increase in farm purchasing power," is the opinion of W. B. Greeley, Secretary-Manager of the West Coast Lumbermen's Association. "In the opinion of experienced British lumbermen who recently visited this country," Colonel Greeley continued, "the lumber supply from the Baltic will be almost cut off. These lumbermen expressed the opinion that Great Britain will have to depend on North America for most of its lumber needs, which will continue to be heavy, and that Canada will fall far short of being able to supply all of them."

In similar vein, Philips A. Hayward, Chief of the Forest Products Division of

the Department of Commerce, stated, "One of the most important points to be considered in Great Britain's securing supplies of softwood lumber urgently needed is the fact that for years it has been dependent to a large degree upon Baltic, particularly Scandinavian and Russian, softwood lumber. With increasing shipping hazards and the eventuality of lack of shipping facilities, it is quite probable that the bulk of softwood lumber supplies must come from the United States and Canada."

"The whole general economic picture, in so far as lumber supplies in Europe to the present time are concerned, is completely upset. Forest resources in Czechoslovakia and Austria will naturally be diverted to Germany. It will be quite impossible to draw upon Rumanian supplies. This adds further to the confusion."

While South America has been importing sizable quantities of softwood lumber, "it is possible," continued Mr. Hayward,

"that we may be able to regain much of the business we have lost in South and Latin American countries due to Baltic competition, tariff restrictions, etc., since undoubtedly it will be increasingly difficult for these countries to export their lumber."

"My guess," declared Wilson Compton, Secretary Manager of the National Lumber Manufacturers Association, "is that the building volume the rest of this year will not be much affected; that it will be smaller next year; that industrial consumption of lumber will advance somewhat next year; that lumber exports will show a substantial increase; and that the national consumption of lumber will continue about the present average level of two billion feet a month."

In conclusion Dr. Compton pointed out that "the present Neutrality Act and the so-called Johnson Act, prohibiting loans to nations in default on former war loans, will undoubtedly restrict war trade."

New Forest Fire Safety Regulations for CCC

Revised safety regulations, designed to minimize the danger of accidents to CCC workers while fighting forest fires, have been announced by Robert Fechner, director of the Civilian Conservation Corps.

The revised regulations, based on extensive study of forest fire fighting methods and hazards to which fire fighters are exposed, include the following requirements: (1) that every CCC camp shall hold a course in safety precautions to be observed in fighting forest fires; (2) that no CCC enrollee shall fight forest fires anywhere unless he has been given previous fire fighting instruction and safety training; (3) that CCC fire fighters work under the supervision of a capable foreman; (4) that enrollees under eighteen, unless specifically exempted, shall not fight forest fires.

"The purpose of the new CCC regulations," said Director Fechner, "is to safe-

guard the lives of enrollees and to increase the efficiency of CCC men on the forest fire fighting line."

Under the new regulations, the safety training course to be held in all camps includes precautionary instruction regarding forest fire fighting as well as the important item of fire behavior. It is applicable also to prairie and peat-bog fires in areas where they occur. Such courses are to be held prior to the opening of the fire season each year, and oftener where new enrollment justifies it.

In specifying that no enrollee be allowed to fight fire unless previously instructed, the regulations refer to the fire fighting training course conducted in camps for some years by federal and state forest and park officers, which include instruction in the various techniques of fighting forest fire, the handling of tools and equipment, and the training of fore-

men and squad leaders.

Further requirements are that each camp list all enrollees who have been given previous fire fighting instructions, including the dates of such instructions, so that only those men whose names appear on this camp roster shall be assigned to fire fighting duty. Furthermore, no enrollee under eighteen shall be assigned to fire duty, except where he is adjudged to be mentally, physically and by experience, equal to enrollees eighteen years of age or over.

"A primary rule of safety in forest fire fighting is adhered to in the requirement that all enrollees sent to fires must be under competent and responsible supervision," Director Fechner said. "The man in charge of enrollee firefighters must remember at all times that his first responsibility is the safety of the enrollees under him."

Hammerle Appointed Georgia Forester

A series of shifts in forestry positions extending from coast to coast culminated on September 16 in the appointment of William C. Hammerle as Director of the Georgia State Division of Forestry, succeeding Don J. Weddell. Mr. Hammerle, a graduate of the New York State Col-

lege of Forestry at Syracuse, was formerly assistant state forester of South Carolina, in charge of fire protection.

Mr. Weddell resigned to become Dean of the School of Forestry at the University of Georgia and thus succeeded Professor Gordon D. Marckworth, who in turn

has accepted the position of Assistant Professor of Forestry at the University of Washington, in Seattle. This was vacated when Professor Walter H. Meyer resigned to fill the place on the faculty of the Yale Forest School made vacant by the death of the late Professor Ralph C. Bryant.

TREE PLANTING ON FARMS DOUBLES

Farmers have more than doubled their tree-planting activities since 1935, according to the federal Forest Service, reporting on the distribution of forest trees to farmers in forty-one states and two territories under the cooperative distribution program authorized by the Clarke-McNary Law.

A total of 55,359,728 trees were distributed during the calendar year 1938, a figure more than double the 26,150,197 trees distributed in 1935. Approximately 41,700,000 trees were distributed in 1937, and 35,600,000 in 1936. The young trees used are seedlings and transplants which farmers can plant at the rate of 500 to 1,000 a day.

Expenditures by the federal government during 1938 in this program were \$75,286, while the states spent \$306,910 on the cooperative project. States distribute the trees at cost or less in order to encourage farm forestry. The states spent an additional \$363,135 on outside projects which include free distribution of trees for planting by community forests, 4-H Clubs, schools and similar organizations.

A total distribution of 7,036,000 forest tree seedlings by Georgia gave that state the lead in the nation during 1938, with New York taking second place with distribution of 5,610,000 young trees, and Pennsylvania third with 4,347,000. Other states which distributed more than 3,000,000 trees include Arkansas, Florida, South Carolina, Tennessee, and Wisconsin.

STATES GET WILDLIFE RESTORATION FUNDS

Secretary of the Interior Harold L. Ickes has apportioned to the various states \$1,380,000 for the development of their wildlife resources during the year that will end June 30, 1940. The funds, administered by the Bureau of Biological Survey, are provided by Congress through the Federal Aid to Wildlife Restoration Act.

Michigan, New York, and Texas will receive the three largest of the allotments, which are made in accordance with the size of the states and the number of hunting licenses they sell. Pennsylvania, Ohio, and California rank fourth, fifth, and sixth, respectively.

States that do not within sixty days indicate to the Secretary of the Interior their desire to avail themselves of the funds forfeit their allotments to the Department for use in accordance with the Migratory Bird Conservation Act, which provides for federal refuges. If a state that expresses a desire to participate fails to propose a project during the year, the allotment is reserved for the state's use and carried forward for one year.

The Federal Aid to Wildlife Restoration Act, commonly known as the Pittman-Robertson Act, provides that Congress may annually make for this program an appropriation equal to the revenue from the federal tax on firearms, shells, and cartridges, which in the past has amounted to about \$2,750,000 annually. The law provides that whatever appropriation is made by Congress shall be apportioned to the states on the basis of

acreage and hunting licenses sold in each state and shall be used to pay seventy-five per cent of the cost of projects to develop wildlife resources in the participating states.

Participation requires assent to the act, payment of not less than twenty-five per cent of the cost of projects, and passage of state conservation laws including prohibition against diverting hunting-license fees for purposes other than administration of the state fish and game department.

This year's appropriation is for \$1,500,000, of which \$120,000 is being used in administering the program.

Last year, first under the new program, with an appropriation of \$1,000,000, fifty-eight research, land-acquisition, and development projects were under way in thirty-two states, and thirty-six other projects awaited final approval. All states except Georgia, Louisiana, Montana, Florida, and Nevada are eligible to participate in the program.

COOPERATIVE FIRE CONTROL IN COLORADO

With the signing of a forest fire protection agreement by the Department of Agriculture and the State of Colorado, the number of states cooperating with the federal government for the control of forest fire under the Clarke-McNary Act has been brought to forty-one states and Hawaii.

The seven states not participating in the federal-state program are Iowa, Kansas, Nebraska, North Dakota, Utah, Wyoming and Arizona. The first four are in the Great Plains Region and have little forest land. Forest lands of the remaining three are mostly in national forests. With much of the West in the grip of the worst forest fire season in two decades, interest in participation in the program is reported to be on the increase in Utah.



Official ★ UNITED STATES FOREST SERVICE HAT

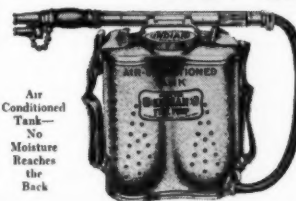
Stetson puts out a sturdy felt ... to give lasting service... to stand strenuous outdoor wear, yet hold its shape. No wonder Stetson hats are official for the U. S. Foresters, many state police, Canadian Mounted Police, and active services all over the world.

JOHN B. STETSON COMPANY
PHILADELPHIA, PA.

Please Mention
AMERICAN FORESTS
WHEN WRITING ADVERTISERS



INDIANS ARE extensively used by state and federal foresters, many of whom have written us in praise of them. May we send you copies?



Air Conditioned Tank—No Moisture Reaches the Back

INDIAN FIRE PUMPS STOP FIRES BEFORE THEY CAN SPREAD!

Fifteen minutes may mean the difference between an uncontrollable forest fire and a completely extinguished grass fire. INDIAN FIRE PUMPS put out 300 ft. of grass fire with one tankful of clear water. Keep 5 gal. rust proof tank filled and you are ready for lightning quick action. Strong 50 ft. stream goes right to the base of the flame. Stop small fires before they grow into big ones!

Send for Catalog and Testimonials



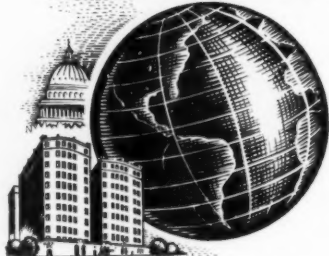
D. B. SMITH & CO., UTICA, N. Y.

PACIFIC COAST AGENTS:

Hardware Equipment & Rubber Co. Western Lumber Machinery Co. J. A. Siegrist Company Roy G. Davis Company
300 Third St., San Francisco, Cal. 307 S. W. 4th St., Portland, Ore. 2224 First Ave., Seattle, Wash. 617 East 3rd St., Los Angeles, Cal.

Please Mention AMERICAN FORESTS When Writing Advertisers

HOST *to the* WORLD



IN THE NATIONAL CAPITAL

When you step into the lobby of this world-famous hostelry you instantly feel that it is a great hotel, great in the sense that it is the home of international personages and a colorful setting for the great events occurring daily within its corridors. This endless procession of important happenings and distinguished guests never fails to thrill the discriminating traveler seeking a standard of service conforming with individual requirements in comfort, hospitality and service. That is why they stop at The Mayflower when visiting the National Capital. Its every modern service and convenient location assures the most for a pleasant stay, yet, its rates are no higher than at less finely appointed hotels.

SINGLE ROOMS FROM \$4
DOUBLE ROOMS FROM \$6

All with bath, of course

WASHINGTON'S FINEST HOTEL

The MAYFLOWER
WASHINGTON, D. C.
R. L. Pollio, Manager

In Colorado, the need for federal-state forest fire control has been advocated by various groups for years. Interest in co-operation deepened since severe fires burned over thousands of acres of unprotected or poorly protected forest land in state and private ownership in the Rocky Mountain and Pacific Coast States in the late summer. State and federal reports reveal that ninety-four per cent of all acreage burned in 1937 was on unprotected forest areas and more than 11 per cent of all unprotected forest land was burned over.

Under the plan for protecting the Colorado forests submitted to the Forest Service in connection with the federal-state agreement, Colorado estimated there was

a total of about 6,021,000 acres of state and private lands in need of fire protection.

The Colorado plan contemplates eventual joint protection of the entire area, though the budget for the next fiscal year provides for the protection of only 456,180 acres. The plan stipulates appointment of a forest ranger, the building of a lookout tower, roads, trails and telephone lines.

Indications are that the cost of protecting the entire Colorado area of 6,021,000 acres described in the plan will be about \$120,000 annually, or slightly under two cents an acre. Under the agreement, this will be shared by the state and federal governments, the latter's share depending upon the funds available for the purpose from year to year.

Witches'-Broom

BY MARVIN E. FOWLER



Witches'-broom on Virginia pine. Note the striking contrast with the normal branch on the right. This is about one-fourth natural size

Certain abnormal brush-like growths of small branches on various trees and shrubs are called witches'-brooms. These growths can be caused by a variety of agencies and may differ greatly in size and shape. *Taphrina* brooms of hardwoods, rust brooms of fir and spruce, and the sooty mold broom of serviceberry are examples of those caused by fungi; the witches'-broom of locust and that of sandalwood are each believed to be caused by a virus; very destructive witches'-brooms are often caused by dwarf mistletoe on pine, spruce, Douglas fir, and larch; some are caused by bacteria, and some others by undetermined agencies.

The accompanying illustration of a witches'-broom on Virginia pine was collected during the spring of 1936 by Dr. J. I. Lauritzen at Chevy Chase, Maryland. The cause of this broom has not been determined, but the broom is of interest because it illustrates so strikingly the peren-

nial type of brooming and because it is probably rare, as no previous report of it on this host could be found.

Because of their excessive growth the parts of a tree which have been stimulated to form a witches'-broom rob the normal parts of the tree of food materials. If this growth continues until late in the season the stimulated parts of the tree may not harden and sometimes winter kill. Witches'-brooms are of economic importance on forest trees whenever they are so numerous as to weaken the tree sufficiently to cause reduction of growth, loss of vigor, susceptibility to the attack of other enemies, or death. However, an ornamental tree might be rendered valueless merely by the unsightly appearance of a single broom. In Ecuador, the chocolate industry was practically destroyed in a ten-year period by a soft-tissue witches'-broom of the cacao tree, caused by an introduced fungus.

Your Forests—Worth Protecting

By George E. Griffith



When the siren wails, and the fire department goes clattering down the street, we wonder immediately whether it is our home that is on fire. Perhaps we telephone and find out. If it is, we are vitally concerned. If it is down in the other end of town—well, it's too bad, but there is nothing we can do about it, and we turn back to our affairs.

Have we overlooked a fundamental psychological truth in our forest fire prevention campaigns? Man is concerned primarily with those things that are close to his own interest—his family, his home, his welfare, his career. Also, he dislikes to be told what he must not or should not do. He is appealed to best by the positive and constructive, rather than the negative.

The average citizen thrills to the brilliant spectacle of a conflagration, if it is not destroying his own property. We have all seen the crowds hampering the fire department at a large city fire. A tourist in Oregon last summer complained that he had driven hundreds of miles and had not seen a good forest fire. A colored exhibit depicting a raging forest fire, used in western fair exhibits some years ago, brought exclamations from many visitors: "Isn't that beautiful!"

In line with this psychology, it would seem that brilliantly colored pictures of raging conflagrations, and the long list of "Don'ts" which have been presented to the forest visiting public may be outmoded. If this public develops a feeling of personal property interest in these forests, together with a love of the beau-

tiful, the romantic, the historic, which are inherent in forest lands, a desire for protection will follow. There is ample material for this approach.

Forests represent payrolls. They touch the lives of every citizen in forest communities. They pay taxes, support schools and other public institutions, and provide the financial blood stream for all the arteries of commerce, of industry, and of the service vocations. They play an important part in the state and national economy. To burn forests is to burn bank accounts. To burn young growth is to burn the interest coupons from bonds. It's not just the other fellow's business. It affects everyone.

Forests represent recreation. The lure of the green, tree-covered hillside; the music of a forest brook; the cool beauty of a forest camp; these are things that every forest visitor can understand. These are his recreational assets, whether he owns the forest land or not. His fishing stream depends upon the forested watershed for proper biological balance.

The forests contain many spots of historic significance. Many of the thrilling and dramatic events of early western history were enacted along this forest stream, beneath this tree, in that forested valley, or on yonder mountain. Instinctively, we reverence these historic spots. We want them preserved, and not desecrated by fire or otherwise.

Your wealth, your beauty, your historic glamour, your romance—these are the organ stops on which I would play the rhapsody of forest protection. An appeal to those fundamental sentiments which move men to action, can be made through these emotions: The sense of protection; the desire for power and popularity; the urge of affections and sentiment. All of these are summed up in the slogan: "They are *your* forests; and they are worth protecting."

SPECIAL FIRE PREVENTION NUMBER OF AMERICAN FORESTS AVAILABLE

To meet an unusual demand it was necessary to print additional copies of the April issue of AMERICAN FORESTS Magazine, devoted entirely to the subject of forest fire fighting and prevention.

We believe this issue contains the best collection of material on this subject ever gathered together and if you do not have a copy, we urge you to send in your order at the regular price of 35c a copy, as long as they are available. We shall also be glad to furnish copies to your friends, your children's school, or the library in your community, mailing them direct for you.

Speed---

is the stuff fire protection is made of!

Check---

your portable pumper equipment today! Have you enough hose, nozzles, fittings?

Fire---

waits for no man. Be ready with speed!

Send today for your copy of Pacific Marine equipment and accessory book to help you check your unit.

PACIFIC MARINE SUPPLY CO.

1223 WESTERN AVENUE
SEATTLE, WASHINGTON

"The Strongest Geared Power for Its Weight in the World"

Two Speeds
Positive Internal Brakes

COMPACT
POWERFUL
SAFE



For Use Where Power Is Not
Practical or Available

Two Ton "Lightweight"—Weight 60 lbs.
Five Ton "General Utility"—Wt. 110 lbs.
Fifteen Ton "Special"—Weight 680 lbs.

Positive internal brake—Two quickly shifted speeds—Adjustable length crank handle—Anti-friction ball bearings—Spring operated safety dog. Only eight parts. No keys or set screws to strip. Drum instantly free spooled for running out cable.

Complete descriptive literature and list of dealers in principal U. S. and foreign cities gladly mailed. Warehouse stocks for dealers supply—Seattle, Chicago, Brooklyn, Houston.

BEEBE BROS.

Incorporated
2728 6th Ave. S. Seattle, Wash.

STAMP OUT FOREST FIRES WITH POSTER STAMPS

REGULATION UNIFORMS FOR

Regular Personnel
U. S. Forest Service

Write for new Price
Lists and Sample
Fabrics.

THE FECHHEIMER BROS. CO.

Uniforms for Over 50 Years
CINCINNATI OHIO





National Park Service

A stout stake is a satisfactory brace for a young tree until it is well established

OCTOBER is an excellent time to plant that shade tree you thought about last spring but just didn't get around to setting out. Evergreens, too, may be transplanted now with success, especially in the milder sections of the country. Fall planting, carefully executed, permits trees to become firmly established in their new homes before freezing weather. Many nurserymen and arborists prefer it to spring planting.

Not all species are successfully moved at this time of year, however. Some trees, while readily moved in the spring, do not easily re-establish themselves in the fall or winter. Included in this group are the magnolias, yellow poplar, yellowwood, sassafras, and others which have a soft, fleshy type of root structure. If planting is delayed until real freezing weather has set in, it is well to avoid transplanting all evergreens and any but the hardiest type of deciduous trees as well, since the danger of root injury from freezing is more serious than some seem to think. This is especially true of conifers and bare-rooted deciduous stock. The warm October sun and the fall rains are ideal for fall planting, so let's not procrastinate.

The various points incidental to the choice of a shade tree were covered in some detail in the March discussion in *Your Shade Trees*, so there is no need of repeating them here except to emphasize the necessity for choosing a vigorous, well formed, insect and disease-free specimen, which is adapted to the climate and site it is to occupy.

If the tree selected is a large one, prob-

ably it will be best to leave the planting to your arborist or nurseryman, but a small one will give more pleasure if we plant it ourselves. So let's suppose that our selection is a pin oak about two inches in diameter—a size which we can handle readily.

If we are wise, we will prepare a suitable planting site for the tree before it arrives from the nursery. Someone said that if he had twenty dollars to spend for a tree, he would pay one dollar for the tree itself and the other nineteen preparing a place for it to grow. While such a statement is an exaggeration, no doubt, it does emphasize the necessity for proper planting methods if we are to have a tree which not only lives but thrives.

If we have to plant the tree in poor soil it will be good judgment to dig the plant-

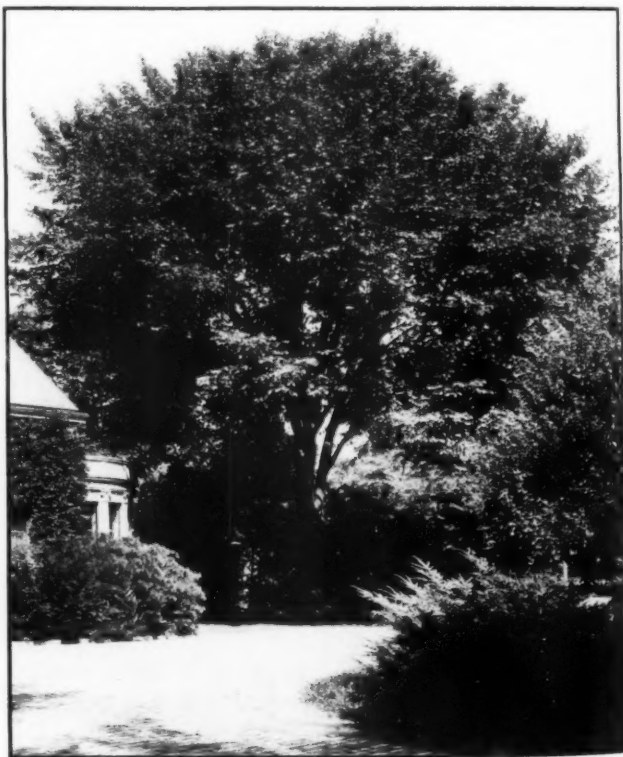
ing hole wide and deep enough to permit replacing the existing soil with several feet of good topsoil—the size of the planting pocket being limited only by our pocketbook. But in any event, the hole should be dug sufficiently large for the roots to be spread out in a normal manner without cramping or twisting.

As the hole is dug, sod is lifted and carried away, topsoil kept and piled carefully, and subsoil unfit for the backfill is discarded and replaced with good friable topsoil—free from lumps, sods and large stones.

To assure the best possible root growth, many experienced ar-

borists are emphatic on the necessity for adequate humus in the soil used as backfill. Some like to use peat moss—mixed one part peat and two to four parts soil, by volume—while others prefer to add well decomposed leaf mold or well rotted manure to the backfill. Regardless of the organic material used, it must be thoroughly incorporated with the soil and so well rotted that further decomposition will not have a detrimental influence on growth. In poorly drained soils it is important to remember that excessive organic materials may make the soils definitely toxic.

This brings us to an exceedingly important point—namely, drainage. No matter how carefully we select our tree, plant, fertilize, cultivate and otherwise tend it, our efforts will go for naught if it has



Charles F. Irish Company

Choose wisely, plant properly, and tend carefully, advises the author, and you will have a rich reward in beautiful trees

AMERICAN FORESTS

wet feet. If one is not sure that his soil is well drained, it is best to err on the safe side and place several inches of gravel below the planting bed—making sure that this collection basin is drained away from the site so that water cannot stand beneath the tree.

It used to be said that a tree should be planted somewhat deeper than it grew in the nursery, but now we know this to be untrue and we do our best to set a tree as nearly as possible to the exact depth it grew before being moved. If the planting pocket of good soil has been properly prepared and leveled off at the proper depth, we can set our tree and spread out the roots in a normal manner. Any broken or bruised roots are cut off cleanly and fine topsoil is worked in around them so that each root is individually packed. When the roots are well covered, the soil is tamped to prevent air pockets. After this, the hole is filled with water and allowed to settle. The hole is then completely filled with topsoil without further tamping and a slight depression or saucer is left around the tree to facilitate future watering. In late fall or winter planting, it is just as well to omit the saucer as there is some danger of ice forming in the depression and injuring the trunk. If the soil is relatively dry, continued periodic watering will be necessary until the ground freezes.

It is usually good planting practice—and more important in the fall than spring—to provide a protective mulch of at least three inches of peat moss, straw, leaf mold, or well rotted manure over the roots of transplanted trees. The mulch tends to keep the soil warmer, retards rapid changes in temperature and cuts down evaporation.

Pruning is a necessary part of the planting operation to compensate for the root loss invariably suffered no matter how carefully the moving has been done. The extent of pruning will depend upon the condition of the tree and its roots and the amount of after care which is assured.

Unless a low-headed tree is desired, the leader of a shade tree never should be cut since such pruning would tend to spoil its ultimate shape, would detract from a strong branch structure and perhaps cause a wound which would heal with difficulty. With the lateral branches these objections do not hold true. Side pruning brings the remaining branches and twigs closer to the main line of sap flow and provides a slender compact head which will readily branch out when growth starts. Don't make the mistake of pruning out the inside of the crown and leaving a few buds on the ends of the branches. This makes circulation difficult and increases the danger of sunscald and borer infestation. We must remember that the only branch on a young tree which has a good chance of remaining permanently is the leader; the laterals will die from shading or will need to be removed to shape the tree. The shape of the crown of a young tree, therefore, is of negligible importance as contrasted with the necessity of making the tree live. So let's not spare the pruning knife when we plant.

It is well to protect the trunks and

larger branches of transplanted trees by wrapping them with burlap or heavy, treated crepe paper. The wrapping retards transpiration and prevents desiccation, prevents sunscald and helps to keep out borers. Tests have shown the treated paper to be superior to burlap.

Our tree will need some kind of support until its anchor roots become established. Perhaps the simplest type of bracing for a small tree is a stout stake driven into the ground next to the tree and to which it is attached by means of some binding material, such as soft rope or a wire which has been run through an old piece of hose to protect the bark. Larger trees are preferably guyed three ways with cable or wire; fastened to the trees with lag screws and to the ground by anchoring to buried logs or deadmen, as they are called.

And now our tree is planted, pruned, mulched, wrapped and staked. Barring unforeseen troubles and with a little, intelligent care it will reward us richly with its shade and beauty.

ALBINO BUFFALO IN ALASKA

An albino buffalo, the third known to be living in North America today, was recently sighted south of Fairbanks, Alaska, by Wildlife Agent Grenold Collins, of the Alaska Game Commission, and Dick Hawley, pilot of the plane in which Collins was making a survey flight in the Big Delta River area. The Biological Survey has one white buffalo on the National Bison Range, in Montana, and donated another of these rare animals to the National Zoological Park, at Washington.

Agent Collins and his pilot were flying along the Big Delta River taking an inventory of the buffalo herd when the albino calf was seen. With the aid of powerful glasses, it was noted that the animal was white, except that a brownish tinge covered the top of the head near the ears. It was impossible to determine whether the eyes were pink.

White buffaloes have always been rare. It is said that in a herd of 5,000,000 buffaloes in southern United States, many years ago, only one albino was seen. The late Dr. William T. Hornaday, famed conservationist, stated that not more than ten white buffaloes or white buffalo skins had ever been seen by white men.

Trees for Forest Planting PINE-SPRUCE

Firs, Arborvitae and Other
Conifers. We raise all our
trees in our own nurseries.

KEENE FORESTRY ASSOCIATES
KEENE, NEW HAMPSHIRE

RHODODENDRONS, AZALEAS, KALMIAS, LEUCOTHOE, HEMLOCKS

Shrubs, Vines, Climbers, Ferns, Orchids, Lilies
and Bulbous Plants. Herbaceous Perennials of the
Blue Ridge Mountains.
Catalog Sent on Request
BLUE RIDGE RHODODENDRON GARDENS
Altamont, North Carolina

TREES FOR SALE

FOR FOREST PLANTING
Norway Spruce, Red Pine, White Pine, Scotch Pine,
White Spruce, Colorado Blue Spruce, etc. Prices are
reasonable and the trees are GUARANTEED TO LIVE.
WESTERN MAINE FOREST NURSERY, DEPT. F.
Fryeburg, Maine

Please Mention
AMERICAN FORESTS
WHEN WRITING ADVERTISERS



means better trees and better foliage. It is easy
to do good work with the BARTLETT PRUNERS.
Write for free illustrated catalogue.
BARTLETT MANUFACTURING CO.
3019 E. Grand Blvd. Detroit, Mich.

GROW TREES FROM SEED

Sow about 3/8-inch deep in a protected part of garden or cold frame.

The Following Varieties are Available in 25c Packets
(Postpaid in U. S. A.)

ORIENTAL SPRUCE
WHITE SPRUCE
NORWAY SPRUCE

COLORADO SPRUCE
RED PINE
YELLOW PINE
SWISS MT. PINE

PITCH PINE
WHITE PINE
SCOTS PINE

Correspondence With Collectors Invited

HERBST BROTHERS

Tree and Shrub Seed Specialists

92 WARREN STREET

NEW YORK, N. Y.

TREES OF THE SOUTH, by Charlotte Hilton Green. Published by the University of North Carolina Press, Chapel Hill, North Carolina. 551 pages. Illustrated. Price, \$2.50.

Over 120 trees typical of the south are described in an informal yet thoroughly accurate manner by Mrs. Charlotte Hilton Green in "Trees of the South." The book is not confined to native species, but includes many well established exotics such as the Chinaberry tree, the mimosa or *Albizia*, and the purple flowered Paulownia.

It is supplemented with introductory chapters describing trees and their flowers. These together with intimate descriptions of many trees and unusual photographs which liberally illustrate the book will make it useful to all who are interested in the trees of the south and eastern states.

THE WORLD OF PLANT LIFE, by C. J. Hylander. Published by the Macmillan Company, 60 Fifth Avenue, New York City. 722 pages. Illustrated. Price, \$7.50.

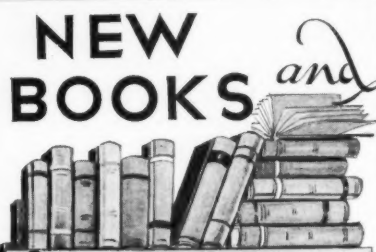
Botany is made fascinating for the layman in "The World of Plant Life" as presented by Professor C. J. Hylander. Progressing from those primitive forms of plant life which reproduce by means of spores, the reader is carried through pages illustrated with line drawings and exquisite photographs into the field of flowers and thus into the realm of trees. Plainly the result of much labor and study, it gives a picture of plant life such as will serve as a reference book for many.

VANISHING LANDS, by R. O. Whyte and G. V. Jacks. Published by Doubleday, Doran and Company. Illustrated. 332 pages. Price, \$4.00.

A serious and thought-provoking analysis of the national problem of soil erosion and its resultant social and economic difficulties is presented here in the hope that conservation of our natural resources may become a paramount objective in our national life. The authors discuss with clarity and authority the physical aspects of erosion and attendant political, social, and economic consequences of the loss of the earth's fertility. The last five chapters are a revelation of startling and dramatic conclusions which command attention and action.

THE CALIFORNIA DESERTS, by Edmund C. Jaeger. Published by the Stanford University Press, Stanford University. Illustrated with line drawings. 209 pages. Price, \$2.00.

"The California Deserts" is a complete description, interestingly presented, of the Mohave and Colorado Deserts of California with their inherent historical, geological, botanical, and other aspects brought into intimate relief. This is an excellent handbook for either the prospective traveler or the fireside reconnoiterer. The revised edition includes up-to-date data regarding the Death Valley and Joshua Tree National Monuments.



OTHER PUBLICATIONS

A list of Selected Books on Forestry and related fields of Conservation is available to members of The American Forestry Association on request.

WINGS AT DUSK, by Eugene Edmund Murphey. Published by Longmans, Green & Company, New York City. 58 pages. Price, \$2.00.

That "ever since the time of St. Luke there have been practicing physicians who have along with their daily work attained eminence in literature and in the cultivation of the humanities," is proved by this delightful group of poems written by Dr. Murphey, who has lived a long and happy life of service, varied by his scientific and literary activities. Dr. Murphey has been called one of America's leading ornithologists, and it is only necessary to dip lightly into these verses to find proof of his love and knowledge of birds—for it trails all through them.

NATURE TALKS, by Alice C. Erwin. Published by Fay Erwin, Harbor Springs, Michigan. 399 pages. Illustrated. Price, \$2.50.

Guided by Wa-was-no-de-kwe, the Lady of the Northern Lights—MM as the Ottawas called her—Alice Erwin takes you into the land of the North—shows you intimately Michigan's nature world. Built by loving friends from her log book, this militant conservationist,—friend of the animals, birds and wildflowers, lives again as "Nature Talks" leads you along her favorite trails.

FEARSOME CRITTERS, by H. H. Tryon. Published by the Idlewild Press, Cornwall, New York. 68 pages. Illustrated. Price, \$2.00.

New light on the life histories of weird animals that people the imaginations if not the actual habitat of loggers and lumberjacks is recorded and pictured by the Tryons in their "Fearsome Critters." This book will take nothing away from science but will add much to American folklore and contribute much to fascinating fireside visits among those whose imaginations are stimulated by strange noises and deep silences in woods and wide open spaces.

Composition of Common California Foot-hill Plants as a Factor in Range Management, by Aaron Gordon and Arthur W. Sampson. Bulletin 627 of the College of Agriculture, University of California, Berkeley, Calif.

Practical Forestry, by Edgar L. Heermance and **Forest Trees of Connecticut**, by Austin F. Hawes and Wilbur R. Mattoon. Publication No. 40. Published by the Connecticut Forest and Park Association, 215 Church Street, New Haven, Connecticut. Price, 25 cents.

An Outline of the Water Facilities Program. Soil Conservation Service, U. S. Dept. of Agriculture. Supt. of Docs., Washington, D. C.

Annual Report of the Commissioner of Conservation and the State Forester and Director of State Parks of Massachusetts for 1938. Public Doc. No. 73, State Department of Conservation, Boston, Mass.

Cooking, Carrying, Camping — On the Appalachian Trail — A manual for beginners, by S. W. Edwards, Box 331, Silver Spring, Md. Price, 25 cents.

Legumes in Soil Conservation Practices, by A. J. Pieters; Leaflet 163. **Erosion on Roads and Adjacent Lands**, by Arnold M. Davis; Leaflet 164. **Soil-Depleting, Soil-Conserving and Soil-Building Crops**, by A. J. Pieters, Leaflet 165. Soil Conservation Service and Bureau of Plant Industry. Supt. of Docs., Washington, D. C. Price, 5 cents each.

Soil Defense in the South, by E. M. Rowalt. Farmers Bulletin No. 1809—Soil Conservation Service. Supt. of Docs., Washington, D. C. Price, 10 cents.

Forest Products Statistics of the Lakes States, by R. V. Reynolds and A. H. Pierson. U. S. Dept. of Agr., Statistical Bulletin 68. Supt. of Docs., Washington, D. C. Price, 10 cents.

Directory of Field Activities of the Bureau of Biological Survey, 1939. Misc. Pub. No. 343. Supt. of Docs., Washington, D. C. Price, 20 cents.

Fifteen Uganda Timbers, by W. J. Eggeling and C. M. Harris—(part of) **Forest Trees and Timbers of the British Empire**. Imperial Forestry Institute, Oxford, England. Price, \$2.00.

Units in Conservation — Vols. I and II, for elementary and secondary West Virginia Public Schools. Published by the Conservation Commission of West Virginia and the State Department of Education, April, 1939.

The Native Papaw, by H. P. Gould. Leaflet No. 179. U. S. Dept. of Agr. Supt. of Docs., Wash., D. C. Price, 5 cents.

Key and Guide to the Woody Plants of Dallas County, by Norma Stillwell, 7460 San Benito Way, Dallas, Texas. Price, 50 cents.

Food of Game Ducks in the United States and Canada, by A. C. Martin and F. M. Uhler. Includes descriptions and discussions of the value and use of a number of plant foods, from the algae to *Zizania aquatica*, or wildrice. Bureau of Biological Survey, U. S. Dept. of Agr. Tech. Bul. No. 634. Supt. of Docs., Washington, D. C. Price, 40 cents.

ASK THE FORESTER

Forestry Questions Submitted to The American Forestry Association, 919 - 17th St., N. W., Washington, D. C., Will Be Answered in This Column . . . A Self-Addressed Stamped Envelope Should Accompany Your Letter.

QUESTION: In what part of the country does osage orange grow best, and where could one expect to get pieces long enough and straight enough to use in making archer's bows?—S. K., Illinois.

ANSWER: The straightest osage orange probably comes from planted hedges or fence rows, in Oklahoma and Texas. It is doubtful, however, if much good bow wood can be had from those sources unless the trees are of good size, because of presence of knot defects.

E. F. Pope, Woodville, Texas; J. J. Kilpatrick Post Co., 724 Insurance Building, Oklahoma City, Oklahoma; and T. E. Ball Boise Company, Farmersville, Texas, are reported to stock osage orange in bow stave forms.

QUESTION: Is it true that when the Pilgrims landed at Plymouth Rock there were 800,000,000 acres of virgin timber in the United States and that at present there is still left 100,000,000 acres of virgin timber? If not, I would appreciate the correct statistics.—R. L., New York.

ANSWER: According to the best estimates, the original forest land of the continental United States was approximately 822,238,000 acres. According to a preliminary report from the Forest Service based on data secured in the forest survey, the present stand of old growth timber consisting of uncut or lightly cut stands of mature timber covers 100,880,000 acres. This is part of our present productive forest area reported to be 461,697,000 acres.

QUESTION: Will you be good enough to let me know if a tree commonly known as the Monkey Puzzle tree or Chile pine grows in this country, or rather would grow in northern New York State? The only actual trees I have ever seen were found in central England.—S. R. G., New York.

ANSWER: The monkey puzzle tree or Chile pine, referred to as *Araucaria araucana* and as *A. imbricata*, is the hardiest of the several species of *Araucaria* and can probably be grown as far north as the Middle Atlantic States in sheltered locations. It thrives well in mild climates in a heavy loam soil, in a moist valley or position sheltered from rough winds. It is questionable, however, if it will stand the winters of northern New York.

The Seed Makes the Tree

(Continued from page 501)

has been shown to produce desirable trees.

When local seed cannot be had, seed originating in a locality of similar length of growing season, same mean temperature of growing season, same frequencies of droughts or other unfavorable conditions, and the same seasonable variations in day length should be used.

Collection of seed should be restricted to sites similar to, or at least no poorer than those on which the resulting stock is to be planted.

Well-informed nurserymen and planters who are convinced of the importance of seed origin should insist upon proof of origin from seed dealers and collectors. Such action, together with requirements of federal and state agencies, should go a long way towards establishing safe seed practice. After experience with such a consumer-control seed policy, it should be possible to judge whether or not legislation is needed, and if so, what form it shall take.

It may prove to be desirable to have laws governing the use of tree seed to aid in uniform application of sound seed practices and to deter the occasional seed dealer who might put his own immediate profit and convenience ahead of the welfare of future harvesters of forest crops.

Co-Op in the Timber

(Continued from page 506)

a reasonable sum. They say that the mill's location and equipment is about what they need. If this mill could be purchased by the co-op, they believe they could saw the side boards off their white maple and sell them to makers of radio cabinets; the boards from rock maple could go into heel stock and flooring; the white birch, into spool stock and into kitchen implement and tool handles, and the basswood would make venetian blinds.

That's what co-op members are talking about in the late summer of 1939. If the association's by-laws are changed, which seems a possibility, they could buy the silent mill and continue the present set-up of financing, plus the issuance of co-op shares. Otherwise, so the talk is going, they'll form a brand new co-op and buy the mill, anyway.

Should the old co-op go out of existence, for the above or for any other reason, it seems sure that a new one will take its place. Despite the four years of ups and downs—and those many wreaths—most participants in the co-operative seem highly favorable to the idea. They have received a lot of valuable education. For the first time in history, perhaps, farmers are giving thought to selective cutting, with the idea of sustained yield. Considerable educational work remains to be done, for among those Coos and Essex farmers are some hard-headed men, set in their ways which are the ways of their grandfathers. One of them recently de-

IN BINOCULARS
ONLY THE FINEST
IS GOOD ENOUGH



Big game hunters, yachtsmen,

Army and Navy officers, Clipper Ship pilots—those who use and need binoculars—agree: No glass that offers less in image brightness, sharpness and clarity, width of field and rugged dependability, than the Bausch & Lomb Binocular, is worthy of their use. Send for free 32-page catalog. Bausch & Lomb, 901 Lomb Park, Rochester, N. Y.

Above, 7 power, 35 mm Binocular, \$86.

BAUSCH & LOMB

Binoculars

THE WORLD'S BEST
... BY ANY TEST

FEARSOME CRITTERS

H. H. TRYON



A fully illustrated natural history of legendary woods varmints.



IDLEWILD PRESS

CORNWALL, N. Y.

\$2.00

A CORDIAL WELCOME AWAITS YOU!

Enjoy the modern luxury of the Hotel Raleigh. Bright guest rooms set a new standard for comfort. Diverting new restaurants, including the glamorous Pall Mall Room, the capital's smartest dinner and supper rendezvous.

450 Beautiful Rooms from \$3.50.

"Just 2 short blocks from the United States Forest Service"

Write for illustrated booklet.

C. C. SCHIFFELER, Gen. Mgr.

HOTEL

Raleigh

PENNSYLVANIA AVENUE AND
12TH STREET, N. W.
WASHINGTON, D. C.

*Measure the Amount of Timber on
Your Southern Pine Woodland or
Forest with a Specially Designed*

LOG-SCALE STICK and TREE-SCALE STICK

—Tell how much lumber in board feet your logs will saw out by careful saw-milling (the International Log Rule), also what they scale by the Doyle Rule.

—Tell how many 16-foot log cuts there are in standing trees.

—Estimate the contents in board feet (by the Doyle Rule or the more accurate International Rule), of standing trees of the Shortleaf, Longleaf, Slash or Loblolly Pines.

\$1 a set, postpaid, including canvas container and book of instructions.

THE
**AMERICAN FORESTRY
ASSOCIATION**

919-17th St., N.W. Washington, D. C.

cided to put in electric light on his home place, after considering the matter since 1904. "I figure," he says, "that electricity has come to stay."

In spite of these few incredibly cautious men, a tremendous change has come over up-country farmers. Some of them even vision a time, and not far distant, when they will crop something from their timber and woodlots every year—what with hardwood, softwood timber, pulpwood, Christmas trees, and yes, even wreaths—instead of every twenty-five to fifty years as in the past.

Joel D. Justin, of Philadelphia, and O. M. Floyd, of Dallas, Texas, engineers employed almost continuously in rendering consulting service to large hydro-electric developments similar to Santee-Cooper, including the Tennessee Valley Authority, reviewed in detail the proposed structures both on the ground and from designs and have given their approval both as to them and to the conditions under which they will be built.

The New York engineering organization of Murray and Flood conducted an independent investigation of the project for private individuals, seriously considering its construction, and they also found it entirely feasible. And finally, before his death several years ago, William S. Lee, engineering genius who supervised the Duke Power Company through all of its construction activities, examined and approved the Santee-Cooper project as feasible and practical.

Thus for want of more specific testimony to the contrary, it would appear that both the Santee and Pinopolis dams will do just what they are designed to do—hold back the waters of the Santee River.

To sum up this far, it would seem that the Santee region does have a place in the industrial scheme of things, that place being determined by available power of

third of their weight of sugar and be recognized as a valuable cattle food. We ate no part of the black locust, but we revelled in the delicious fragrance of its abundant blossoms which on quiet, warm evenings literally filled the air, and we made little hens from individual flowers. Pinch off the flower with enough of the stalk to serve as a bill, rip the bottom of the keel with a pin, bend down the enclosed column of united stamens for legs, and you have a very presentable, as well as fragrant, little white hen.

Drink from trees suggests first of all the maples, and in my view their natural sap, a simple, pleasantly sweet liquid, is preferable to any of the products of its concentration. Tapping time comes early in that auspicious season, spring. To be among the trees then, to see the earliest

Two-thirds of Coos and Essex counties is fit only for growing timber. It grows rapidly there. The farmers have learned, and learned the hard way, that co-operatives may not be Utopia but they can be made to pay a bigger return for all than can fierce individualism. When they get their teeth into practical forestry, as many of them seem to be doing, better than one million acres of New England timberland can be made to pay regular and continuous dividends—something that has never happened in America on so large a scale. It isn't too much to expect.

Conservation Over the Dam

(Continued from page 510)

low rate, resource development, and the ability of the South Carolina Public Service Authority to "sell" the region, after development, to industry. From available information, it seems evident that while there may be no immediate demand for additional hydro-electric power in South Carolina, there will be by 1941; evidence also points to little demand for a water route between Charleston and Columbia, but it seems logical that such a waterway may bring about lower freight rates for certain slow-moving farm and industrial commodities. Flood control, reclamation and reforestation are all arms of the larger power-navigation setup and are important only in that they represent a planned conservation effort on the part of the project's builders. And as to the feasibility of the engineering features, the weight of evidence seems to be with the project engineers.

From this summary one might well ask—why the great controversy over the Santee-Cooper project? For one thing, it has a political background which has created extreme prejudices. But what is more to the point, it involves a conservation concept—a concept which must define the delicate values and balances of timber, wildlife and man prospering together. In the November issue these elements as they relate to the Santee-Cooper project will be explored and discussed.

Tree Memories

(Continued from page 503)

flowers, to hear the first birds, and to drink sugar-water—that is prime living. In many places hydromel, which is honey in water, cooled in ice, is served as a luxury. We have delicious maple sap as nature mixed it, cold as the first relaxing of the frost will permit it to flow, and the luxury of having it obtainable at only one season.

In every region tea is made from natural growths, more kinds for medicine, perhaps, than for beverages, but usually some plant can be found to serve as the basis of a pleasant brew. In the countryside of which I write, spice-bush was good enough for boys, and sassafras even for more exacting elders. Made from the bark of the roots and steeped—as all tea should be—just enough to capture the flavor and aroma and exclude tannin or

other undesirable constituents, sassafras tea is indeed as pleasant a beverage as one can desire.

Aside from memories of childhood, my liking for this tea was fixed in college. There, with a few pennies' worth of rolls or cakes, and sassafras tea costing nothing except for its sweetening, friendship blossomed at its disinterested best and the problems of life were discussed with greater satisfaction than ever again. So sassafras tea means more to me than a delightfully tinted and deliciously flavored beverage; it carries with it a host of pleasurable memories. But are not such unforgettable associations a large part of all our pleasures, whether of trees, of their products, or of anything we fondly remember?

Here I have recorded mostly the tree associations of my youth. Experiences with trees have widened since then and pleasure in them heightened. Then, perhaps, I should not have thrilled as I since

have to the purely esthetic appeal of trees, as to the gracefully nodding tips of the hemlocks, to the framing of some memorable view by the draped arch of a widely branching elm, or to the inimitably lovely blending of green, silver, orange, and scarlet in a frosted maple. Then I had not seen the really great trees, the redwoods and sequoias. Now I have. Among them quiet reigns which one's tread on the softly needle-carpeted ground does not disturb. There is a great, an abiding peace, and one's whole being is suffused with it. In that wondrous calm, as one's glance follows up the giant trunks, ecstasy mounts until at last when the serene blue sky is seen framed by these symbols of the infinite, it reaches an exaltation that is as near the fancied glories of another sphere as a mortal ever can attain. In such moments one realizes that there is an appreciation of trees poignant beyond expression, a love of trees quite past the telling.

Blister Rust Threatens the Sugar Pines

(Continued from page 495)

of California and Oregon and that the most profitable and economical protection would come from the destruction of host plants before the blister rust arrived, ribes eradication was undertaken on an experimental scale as early as 1925 and 1926 in the Rogue River National Forest of Oregon and on the Stanislaus National Forest of California. This work was carried out under the supervision of the Bureau of Plant Industry in cooperation with the Forest Service, both of the U. S. Department of Agriculture. The immediate aims of the project were to ascertain, by actually performing the work, the conditions and problems affecting ribes eradication, and to develop by trial the type of blister rust-control organization and the methods of work best adapted to conditions prevailing in the sugar pine belt. Data were also obtained on the costs of ribes eradication, and a group of foresters was trained to enable them to cope with the large control job ahead. The principal problems have been the extensive acreage involved, the difficulty of destroying the currant and gooseberry plants under mountain conditions, and the need of a large amount of man-power to handle the work. Uprooting ribes is hard labor, since the bushes grow on steep hillsides, in rock crevices, in brush thickets, in fact in almost every conceivable location in the mountains. Eradication therefore is a job for vigorous and active men. The work must be done during the growing season when the bushes are in leaf so that they can be readily distinguished from other plants.

The eight years of experimental Ribes eradication in Oregon and California, ending in 1932, resulted in covering only two per cent of the major sugar pine area of the two states, for control work during that period could necessarily be carried out only on a limited scale. By that time the depression had changed the labor problem from one of shortage of man-power to conditions of widespread unem-

ployment. The first relief measure at that time was the organization of the Civilian Conservation Corps. Large numbers of mainly city-bred CCC youths swarmed wide-eyed and open-mouthed into the forests and many of the enrollees were made available for blister rust control work. Later more men and money became available for eradication operations under the National Industrial Recovery Act. When the last ribes was uprooted in the fall of 1933 the count for the season was 5,761,947 ribes bushes—more than had been grubbed out in all the previous years put together. These bushes were eradicated from 39,957 acres, almost as large an area as the total acreage protected from 1925 to 1932. At last the blister rust-control program seemed to be making satisfactory progress.

In 1934 the project was transferred from the Bureau of Plant Industry, a research organization of the U. S. Department of Agriculture, to the Bureau of Entomology and Plant Quarantine, which was so organized that it is able to handle large-scale control and eradication programs. During that year more men and funds were available than have been used during any succeeding season and consequently that was the most noteworthy summer of accomplishment to date. More

Bargains in New and Used Glasses!



All makes, sizes and powers of nature, sport and hunting glasses, \$6 upward. Telescopes, spotting and riflescopes. Microscopes, magnifiers and compasses. Repair work and goods guaranteed. Catalog Free. Address Box M

J. ALDEN LORING, OWEGO, N.Y.



5-MILE RANGE — High Grade

BINOCULARS

10 Days' Free Trial \$4.75
Prepaid or C. O. D.

Case & Straps included. Selected High Power carefully ground Lenses give wide, perfect field of vision. Powerful, accurate, latest 1939 features. Pupillary adjustment. Center focusing. Ideal for Hunting, etc. Big Value. If dissatisfied after 10 day trial, money refunded. Order Today!

BENNER & CO. B-31 Trenton, N. J.

More Ducks Come

For GIANT WILD RICE

WILD CELERY, NAJAS, MUSKGRASS.

Plant Terrell's sure-growing feeds NOW. We

invite comparison. Describe your place. We'll

make suggestions and send you booklet FREE!

TERRELL'S 37 C. Block

Oshkosh, Wis.

Plantings made—43 years success.



ATTRACT WILD
DUCKS & FISH

with wild rice, wild celery, duck potato and 30 others described in free illustrated book. Write for planting advice and book.

WISCONSIN AQUATIC NURSERIES,
Box 331-K, Oshkosh, Wis.

FOR INVENTORS

INVENTION
RECORD FREE

Write today for valuable 72-page booklet "How to Get Your Patent" and "Record of Invention" form—both free. L. F. RANDOLPH, 586 Victor Bldg., Washington, D. C.

Fred C. Knapp, Portland, Or.

—BUYS AND SELLS—

Western Timber Lands

Hotel Wachapreague

Sportsmen Family Fishing Recreation Resort



CHANNEL BASS

Strike Best Sept. and early Oct.

All Salt Water Varieties Inland Ocean

Fishing Dates April to November

Own Vegetable Farm, Sea Foods Gaires

Amer. Plan \$3.50, with bath \$4.00 per person daily.

Rooms, outside, double and single beds. Booklets.

HOTEL WACHAPREAGUE, Wachapreague, E. S. Va.

A. H. G. Mears (Ownership Management)



HOTEL CHELSEA

ON THE BOARDWALK
ATLANTIC CITY, N. J.

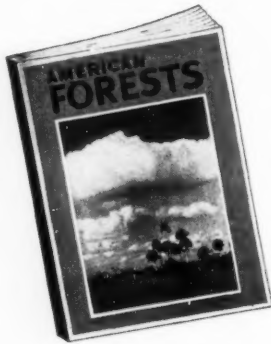
To the World's Fair Grounds
from the World's Play Ground

En route to the Fair, make it a point to visit Atlantic City, where a stay at the cosmopolitan Hotel Chelsea will add pleasure and interest to your trip... A pause amid the friendly hospitality of The Chelsea will provide that restful interval you need before "doing the Fair."

Special
Weekly
Rates

\$6 ROOM
& BATH
\$3 ROOM
ONLY
& BATH
Per Person 2 in
a Room—Daily

YOUR INVITATION TO MEMBERSHIP IN THE AMERICAN FORESTRY ASSOCIATION



AMERICAN FORESTS IS SENT
MONTHLY TO MEMBERS

ASSOCIATION OBJECTIVES

- Adequate Forest Fire Protection by federal, state and other agencies.
- Reforestation of Denuded Lands valuable for timber, wildlife, protection of streams.
- Protection of Fish and Game and other wildlife under sound game laws.
- Prevention of Soil Erosion
- Preservation of Wilderness for Recreation
- Establishment of State and National Forests and Parks
- Development of Forestry Practices by the forest industries.
- Education of the Public, especially children, in respect to conservation of America's natural resources.
- Forest Recreation as a growing need for the development of the nation.

The AMERICAN FORESTRY ASSN.
919 - 17th St., N. W., Wash., D. C.

I hereby apply for membership in The American Forestry Association and enclose \$.....

INDICATE CLASS DESIRED

- ☐ Subscribing Membership, per year \$4.
- ☐ Contributing Membership, per year 10.
- ☐ Sustaining Membership, per year 25.
- ☐ Life Membership (no other dues for life) 100.
- ☐ Patron Membership (no other dues for life) 1,000.

Canadian Postage 25c extra, Foreign 50c extra, on Subscribing Memberships

Name.....

Street.....

City and State.....

than twenty million ribes were destroyed in Oregon and California on 216,700 acres. Since that time the sugar pine forests of the Pacific Coast have been covered on ribes eradication work at the rate of from 60,000 to 200,000 acres a year. Of these about a fourth have been national forest lands worked by the Forest Service.

The first finding of blister rust in California was in the summer of 1936 when it was discovered at five different locations all within five miles of the Oregon border. No one knew how swiftly and to what extent it would then make its way into the Sierra Nevada regions. An alarming answer was given in 1937, for that year blister rust not only retained its previously established grip across the threshold of the state line but was found 125 miles farther southward in the Coast Range and a similar distance in the Sierra Nevada. By October, 1938, it had reached the lower part of the Plumas National Forest, 160 miles south of the Oregon border.

In two years blister rust has thus advanced one-third of the way into the sugar pine belt of California where, starting in 1933, six years of relatively large-scale control work have accomplished but one-fourth of the ribes eradication job. Fortunately the disease is still in its incubation stage on sugar pine, and secondary spread from the pine trees has not yet taken place. In Oregon, however, damage to sugar pines in the southwestern part of the state is already noticeable, and the disease has become very virulent and destructive in the northern sections of the state on Western white pine and white-bark pine.

Exclusive of scattered trees and stands, there are some twenty-five billion feet of mature sugar pine in California and Oregon which have a stumpage value of approximately 100 million dollars. More valuable than this, however, is the potential wealth represented in the young forests from which the mature timber has already been cut. These young trees, given protection against fire and blister rust, will become the forests of the future.

The lumber operations in the sugar pine regions are responsible for the direct employment of more than 20,000 people and indirectly support many thousands more.

While furnishing the basis for the economic and social welfare of numerous communities, this industry produces a commodity second to none in quality in the softwood market and has an average mill-run value of more than ten million dollars a year. The future of this enterprise in California and Oregon is dependent on the continuance of successive sugar pine crops, and the young pines of today must be saved from the threat of blister rust if they are to become the forests of tomorrow.

In addition to the timber resources and economic values of the sugar pine forests, they represent one of the most important features of the recreational areas. This is particularly true in the national parks. In California there are over 200,000 acres of sugar pine within the park boundaries. The majority of this acreage is in Yosemite and Sequoia National Parks, and smaller stands are found in the Lassen Volcanic and General Grant National Parks. Set aside for the preservation of the Sequoia Bigtrees, in Sequoia National Park may be found as well western white pine, white-bark pine, limber pine, and magnificent stands of sugar and fox-tail pines, the sugar pine growing side by side with the Bigtrees. No monetary value can be placed on these reserves of virgin timber that are being maintained in their natural state as specimen stands for the benefit of this and generations to come. Although such values are intangible, they are none the less real. For the people who yearly spend their vacations in the parks, the cash price the trees would bring as lumber is negligible compared with their esthetic value.

The blister rust control program is now in active progress in the sugar pine region of California and Oregon. The federal government, working through the Bureau of Entomology and Plant Quarantine and the Forest Service of the U. S. Department of Agriculture as well as the National Park Service of the Department of the Interior, is vigorously applying control measures to save the magnificent sugar pine forests of the Sierra Nevada and southern Cascades. Success depends upon continued large-scale eradication of ribes during the next few years and the active cooperation of public, state, and private agencies in this work.

We Go Fishing and Meet a Biologist

(Continued from page 497)

"we've been doing our stuff farther up on the high lakes. And by the way, we've been running into lots of 'snakes,' as we call them—long, big-headed, bung-eyed trout that looked half starved and not worth packing out. A few years ago it was swell fishing—lots of two and three pounders. What's happened?"

"Sounds like too many fish and too little fishing," answered Needham. "By controlling the feed, trout of that description have been produced under experimental conditions. The lake may have had plenty of food when first stocked, but due to natural spawning and little fishing the food supply is probably deficient, and the fish suffer accordingly."

"How fast do fish multiply anyway?" I inquired.

"Under hatchery conditions," was the reply, "eggs can be produced at the approximate rate of 900 per pound of brood fish, but in natural streams—well, that's just one more problem we hope eventually to solve here. But starvation is only one of the many hazards trout fry must face. There is predation, disease, bad water—Lord knows what! When we learn more about these hazards and losses we should be able to avoid them."

"Why did you pick Convict Creek for your experiments?" I asked.

"It is a typical mountain stream, takes quite a beating from the hordes of fisher-

men during open season, is about average in width, and water temperatures run around sixty degrees in summer," was the immediate reply. "So being an excellent trout stream with fair cover, data we gather from our experiments here will be applicable to similar streams elsewhere."

As we walked along we noticed that from the old bed of the stream numerous side channels projected in meanders, each containing several reaches of from 100 to 400 feet in length, and divided by dams and screens. "Here," said Needham, stopping at the first of these pools, "we have endeavored to maintain conditions as nearly natural as possible. All of the requisites for a first class trout home are fulfilled—rubble, gravel, silt, sand, and organic detritus constitute the types of bottom. And we haven't forgotten the trimmings. Notice the grass, branches, roots, overhanging willows and even undercut banks to provide a haven of refuge. Each section is a controlled stream in which the factors of size, numbers and species may be modified and studied."

"But what about hazards?" asked Soapy. "Can your data have a true relative value when all that bunch of fat rainbows have to do is live and make love when spawning time comes? Seems to me you should provide some bedevilmments to balance it up."

Needham grinned but said nothing. Walking over to a pool in which a school of six-inch rainbows were slowly milling around, he suddenly stamped his feet. Instantly two great fish shot out from beneath the bank and raced upstream, their sides glistening in the light of the sun.

"Holy Smoke!" gasped Soapy, "Predators—five pounders if they weigh an ounce! Well, I guess you guys have thought of everything. But just a minute, how about self defense? Those babies look like a set-up for a royal coachman."

"That will come later," Needham explained. "At present no fishing is permitted in the station, but when the time comes that we must weigh our results by this factor, we will provide controlled angling to fit the requirements of our studies."

By now we were nearing the upper reaches of the station where attendants were removing bottom material from a section of drained channel. The ever obliging Needham informed us that bottom samples taken regularly from measured areas of the stream, analyzed and classified, show not only what food was present when planting started, but also the rate of decrease or growth, and what preference, if any, was shown by the trout for a particular food.

In another section a portable gas engine pump was draining a pool. As the water lowered attendants gathered up the fish and placed them in "live" cans. Selecting a container which held about a dozen trout of assorted sizes, Needham invited us to come up to camp and watch the completion of a field test.

After seeing that we were comfortable, he began laying out instruments—scalpels, tweezers, trays and a set of delicate scales.

Stamp Out Forest Fires with POSTER STAMPS



EACH STAMP IN 4-COLORS

Forest Fire Prevention Poster Stamps are still available to individuals and organizations interested in spreading the message of Forest Fire Prevention.

These beautiful 4-color Poster Stamps have been reproduced from the Association's Fire Prevention Painting by the celebrated artist James Montgomery Flagg. These stamps are ideal for use on letterheads, envelopes and other mailing pieces and each sheet purchased and used will mean 100 individuals have been appealed to directly in the immediate fight to "STOP FOREST FIRES BEFORE THEY START."

The fire season is not over—hazardous weeks still remain. In purchasing these stamps you can be sure that the people in your town, the men you do business with, your friends who are taking motor trips, are warned of the damage they might do by some small carelessness. Remember, that if you can make them think about fire prevention, they will practice it.

ORDER BLANK

Please send me _____ sheets (\$1 per sheet) of Forest Fire Prevention Stamps (100 to a sheet). I enclose \$_____.

Name

Street Address

City..... State.....

Fill in, tear out and return to

THE AMERICAN FORESTRY ASSOCIATION

919 SEVENTEENTH STREET, N. W.

WASHINGTON, D. C.

Index to ADVERTISERS

October, 1939

American Fork and Hoe Company	515
American Telephone and Telegraph Company	2nd Cover
Austin-Western Road Machinery Company	4th Cover
Bartlett Manufacturing Company	521
Bausch & Lomb Optical Company	523
Beebe Brothers, Inc.	519
Benner and Company	525
Blue Ridge Rhododendron Gardens	521
Caterpillar Tractor Company	483
Chelsea Hotel	525
Fechheimer Brothers Company	519
Herbst Brothers	521
Idlewild Press	523
International Harvester Company, Inc.	513
Keene Forestry Associates	521
Knapp Company, Fred C.	525
Loring, J. Alden	525
Mayflower Hotel	518
Mears, A. H. G.	525
Pacific Marine Supply Company	519
Raleigh Hotel	524
Randolph, L. F.	525
Smith & Company, D. B.	517
Stetson Company, John B.	517
Terrell's	525
Western Maine Forest Nursery	521
Wisconsin Aquatic Nurseries	525

"Looks like an autopsy coming off," observed Soapy.

"Right," replied Needham. "Here is where we find most of our answers." With the tweezers he drew a six-inch Loch Leven from the container and placed it on the scales. Quickly he weighed and measured the fish, then placed it in a can of formaldehyde solution. In a few seconds it was dead. Removing it once more he deftly made an incision in the trout's stomach with the scalpel, then replaced it in another container of the same solution. "Stops digestion," he replied to our unspoken question. "We want to analyze his bread basket as it was when he was alive. Without that treatment the digestive juice would continue to function for some time. Fly, larvae and pupae are hard enough to classify when they are whole; let them be partly digested and its almost impossible."

"Why such accurate scales?" I inquired, eyeing the beam balances he was using.

"Those are the life of the project," was the answer. "All fish are weighed and measured before planting and at the end of each experiment. Their growth rate and condition may be easily determined this way. Different methods of stocking are employed in the various streams, small fish in some, large in others, a few in one section, many in another. Their actual growth, if any, must be determined by counting, measuring and weighing at intervals.

"How does the food supply of Convict compare with other streams?" questioned Soapy.

"Fair," answered Needham. "Fifty samples taken during a three-month period show an average production of .31 grams of trout food a square foot. If you figure that up, an average standing crop of 128 pounds of food an acre of bottom is the result—and that is much better than some mountain creeks.

"Do you find cannibal trout when there is so much food?" I asked.

"Oh, yes," replied Needham. "A trout is a potential cannibal from the time he is large enough to swallow a lesser fish. Up at Hot Creek Hatchery those big rainbows get so rambunctious at feeding time they will actually grab your finger and hang on while you lift them half out of the water. An attendant once threw a live five-foot blow snake into the pond, and in less than a minute it had disappeared down their throats."

As we prepared to leave we let our host know that here were at least two fishermen who would no longer complain about sacrificing a mile or so of favorite water to science.

"Our greatest measure of success will come when experiments have shown how many fish are being planted only to die from starvation or predators, and the correct number and species to plant for any given stream," were Needham's final words. "Of course, we may never attain results of mathematical exactitude, but given time, we will have relative values that will prove helpful in solving these problems. Guesses and rank speculation will then be a thing of the past."

WHO'S WHO

Among the Authors in This Issue

WINFIELD B. DUNSHEE (*Blister Rust Threatens the Sugar Pines*) is a native Californian and an authority on blister rust. Experienced in all phases of the work, he has for the past year been stationed at the Oakland office, handling public information.

ERLE KAUFFMAN (*Conservation Over the Dam*), an associate editor of this magazine, had long reportorial experience with leading newspapers and publicity agencies both in the East and West before joining the staff of the Association in 1927. He recently made a special trip to South Carolina to study the situation and report directly from the delta on the much discussed question of the Santee-Cooper hydro-electric navigation project. His findings are enlightening.

GEORGE A. LEWIS (*We Go Fishing and Meet a Biologist*)—another Californian—is an outdoors man whose writing in that field is familiar in current magazines. An inveterate fisherman—until the hunting season opens—he always carries his camera, and uses it to good effect.

M. A. HUBERMAN and L. S. GROSS (*The Seed Makes the Tree*) collaborated on this interesting exposition of the newest methods in practice to insure a good tree crop. Both Forest Service men, Mr. Huberman was grad-



M. A. Huberman



L. S. Gross

uated from the Michigan State College and Yale School of Forestry and has specialized in planting and nursery work, while Mr. Gross—a Penn State forester—was for seven years Chief of Planting of the Eastern Region. Both are attached to the Washington office.

W. L. MCATEE (*Tree Memories*) a member of the United States Biological Survey since 1904, has done important work in wildlife research and is an authority on birds. Here, however, he wanders back over a boyhood trail of trees he knew and loved.

STEWART H. HOLBROOK (*Co-Op in the Timber*)—well known to our readers—tells here the interesting story of how the farmers of New England have banded in cooperation to better operating conditions and stimulate production—both to the benefit of the forests and themselves.

THE COVER—"Spirit of the Storm"—at timberline in Colorado, by Don Kemp.

SIX IMPORTANT BOOKS

PUBLISHED AND RECOMMENDED BY THE AMERICAN FORESTRY ASSOCIATION

THE FOREST MANAGER

DR. KARL DANNECKER

\$2.00

THAT owners of farm and other small forest holdings may have a better understanding of the management of their properties, The Association has just published *The Forest Manager* by Dr. Karl Dannecker. This book is a translation of a German forestry classic, describing the application of forest management to privately owned forest lands, based on years of experience in Germany. The desire "to help the farm woodland owner in his search for the knowledge necessary to handle his forest in an orderly manner" was the motivating idea of the author. With simple clarity, *The Forest Manager* tells why the selection forest is both economical and profitable; why and how the natural forest form should be retained. This book is especially commended to the attention of all forest owners and managers.

KNOWING YOUR TREES

G. H. COLLINGWOOD

\$1.00

A book on trees which contains actual photographs of each tree, and of the leaf, bark, flower and fruit. This book brings into one volume the pictorial tree descriptions that have been a feature of AMERICAN FORESTS magazine for the past five years. It contains 500-word descriptions of fifty of our best-known American trees—the natural range, commercial uses and identifying characteristics peculiar to each tree. Simply written and handsomely illustrated, it is the ideal book for the young or the old tree lover. You will find it a useful companion at home or afield.

AMERICAN CONSERVATION

OVID BUTLER

\$2.50

This volume presents a clear picture of America's organic natural resources, the part they have played in the development of the nation, the manner and consequences of their use, and the spread of the conservation movement from its beginning in the United States down to the present time. Very little to read in this big book because 216 pictures and brief paragraphs tell the story. Pictures are on every page; scenes of forests, wildlife, lumbering, and conservation.

RANGERS OF THE SHIELD

OVID BUTLER

\$1.00

Forest ranger stories. Thrilling adventure stories of forest fires, exciting man hunts, timber disputes, encounters with wild animals and other experiences.

FOREST FIRE AND OTHER VERSE

JOHN D. GUTHRIE

\$1.50

For those who love the out-of-doors, this collection of verse and songs brings the feeling of melody and rhythm, pathos and humor of life in the open. More than 300 well known ballads and many new poems—a thoroughly enjoyable book.

TREES OF WASHINGTON, THE MAN — THE CITY

ERLE KAUFFMAN

\$1.00

An intimate glimpse into the First President's life with trees — records that he wrote in his diary concerning his love for them. Tells also of the famous trees associated with him, particularly the trees of Washington, D. C.

ORDER ALL BOOKS FROM

THE AMERICAN FORESTRY ASSOCIATION

919 SEVENTEENTH STREET, N. W.

WASHINGTON, D. C.

A "MUST" MACHINE



**For Safe and Economical
Handling of Many Forest
Service Construction and
Maintenance Jobs.**

● Men in the forestry service who have seen the A-W "99" Motor Grader perform, agree that here's a "must" machine for forestry road building and maintenance... a definite time and money saver for every type of motor grader job.

Check these distinctive "99" features and judge for yourself: Its four wheel drive and four wheel steer provide exceptional traction and maneuverability... gives extra driving power for fast, efficient scarifying, ditching and grading under conditions that would stall conventional motor graders.

Its remarkably short turning radius and perfect visibility provide the highest degree of operating safety while speeding all types



Six "99's" ready to go into service near Missoula, Montana. These are only a few of the total number of "99's" now making good under the exacting requirements of state and national forest service work.

of work amazingly on narrow winding roads and mountain trails. It follows a sharp curving ditch line without backing up... pulls deeper ditches... handles a full load on the blade without side slip... eliminates the need for a tractor for bulldozing, pulling a blade grader, etc.

Write for full facts on the "99's" performance record on forest service projects... the reasons back of the rapid increase in Forest Service specifications making the "99" a "must" machine.

The AUSTIN-WESTERN
ROAD MACHINERY CO., Aurora, Illinois

Motor Graders
Roll-A-Planes
Rollers
Snow Plows

Crushing and
Screening Plants
Washing Plants
Blade Graders

Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders

5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

